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**The Ferns and Fern-allies
of Costa Rica, Panama, and the Chocó
(Part 1: Psilotaceae through Dicksoniaceae)
by
David B. Lellinger**

pteridologia

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David B. Lellinger

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INTRODUCTION

My interest in the pteridophytes of Costa Rica, Panama, and the Chocó began as a result of helping to teach a fern course in Costa Rica offered by the Organization for Tropical Studies in the summer of 1967. In preparing for the course, I compiled most of a checklist of the pteridophytes of Costa Rica based on specimens present in the U. S. National Herbarium. Later, in attempting to identify specimens collected during the course, it became obvious that the checklist was incomplete, that few adequate monographic works were available to aid in identification, and that a modern pteridophyte Flora was vitally needed for the region.

The pteridophytes of the area are as diverse as the landscape; I recognize about 1100 taxa in 117 genera, and new species or species new to the area still are discovered from time to time. Species that became known to me after the plates were assembled (e.g., 137a *Llavea cordifolia*) are given "a" numbers. They and a few others are not illustrated. Judging by the rate of discovery, the Flora appears to be at least 90% complete. The relatively little-known Atlantic slope of the mountains from Central Costa Rica to central Panama is most likely to yield new discoveries and should have first priority in future exploration.

The Nicaraguan border with Costa Rica was chosen as the northern boundary for the Flora because Nicaragua lacks the high mountains that characterize Costa Rica and western Panama. As Costa Rica is phytogeographically continuous with Panama, so is eastern Panama with adjacent Colombia. To find a natural southern limit for the Flora, Prof. Elías R. de la Sota, of the Museo de La Plata, La Plata, Argentina, and I undertook a survey of Chocó pteridophytes in January–March, 1971. We gathered what data we could from other pteridophyte collections and made several collecting trips to diverse sites, mostly in the northern half of the Depto. del Chocó. We found that the Chocó pteridophyte flora changed rather abruptly at an elevation of 1000 m in the Andes Mountains to the east of the Chocó basin, and so this was taken (with the Golfo de Urabá and the drier regions to the east and the perpetually wet regions to the south beyond the Río Calima in Depto. El Valle) as the limit of the Flora (Lellinger, 1975). Although these boundaries do not coincide precisely with those of the Depto. Chocó, they do come fairly close. Tallies of the species of pteridophytes found in the Chocó and in Panama and other countries and island groups of the western hemisphere also show that the pteridophytes of Costa Rica, Panama, and the Chocó are a coherent phytogeographic group (Lellinger, 1975, 1985). Cocos Island, a possession of Costa Rica far from the mainland, is not treated in this Flora (see Gómez P., 1975a, b).

Many species of pteridophytes are quite restricted in the elevations at which they will grow; coastal and lowland habitats versus montane habitats is a fundamental and useful distinction to make. The lowland ferns (up to 500 m elevation) tend to be widespread, ranging as far as southern Mexico and Brazil. The montane ferns (500–1500 m or greater elevation) are often more restricted in distribution and are more likely to be endemics. The richest pteridophyte areas are the undisturbed saddles between mountains from central Costa Rica to western Panama at mostly 1000–1500 m elevation, where cloud-borne moisture

from the Caribbean refreshes the epiphytic ferns almost daily, even during the dry season. Any lengthy dry season, as in the northern half of the Chocó, makes it impossible for most epiphytes to grow, and so severely limits their diversity. Throughout the Flora area, species diversity is greatly diminished in secondary forests, even those in good condition that are often thought to be primary forests. The diversity of ferns and fern-allies in primary forests is at least twice that in old secondary forests in good condition. Many of the rare epiphytes in such genera as *Elaphoglossum* are known only from old collections. It may well be that some did not survive cutting of the primary forests and are now extinct. The best hope for rare species lies in preserving large tracts of undisturbed forest, as is being carried out on an unprecedented scale by the people of Costa Rica.



Map of Costa Rica

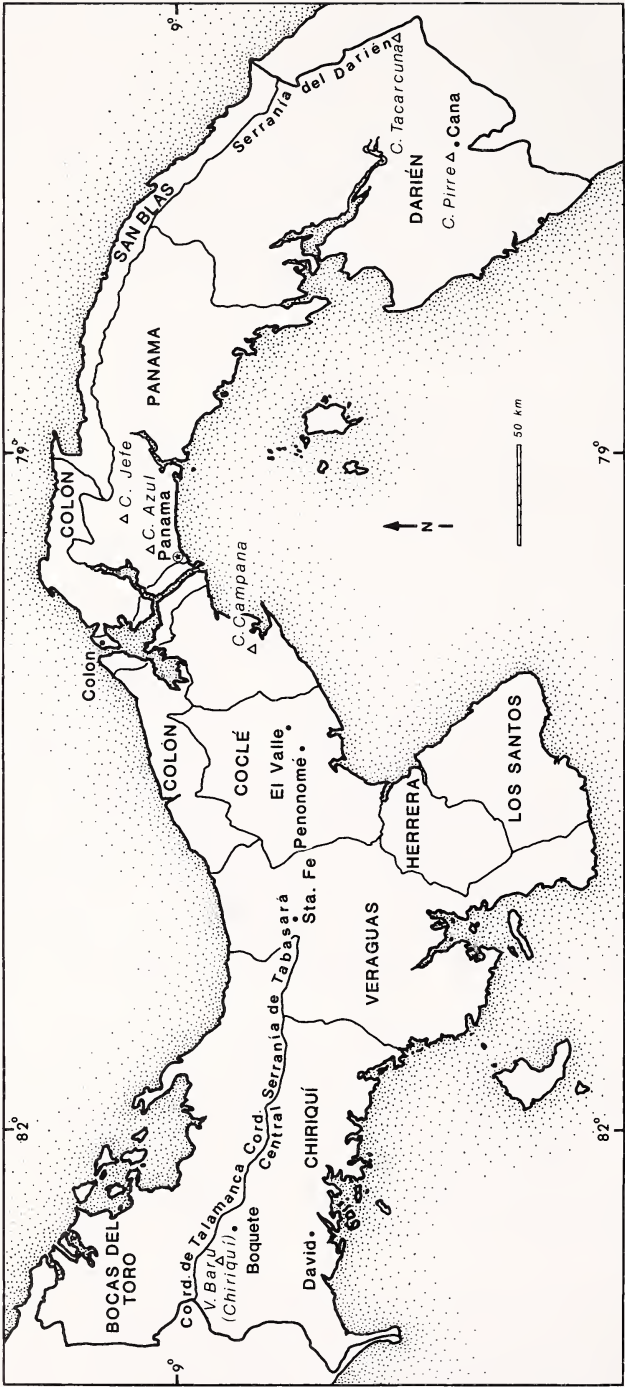
My aim has been to produce a Flora especially useful for identification and curation. Therefore, I emphasized the keys, generally using two or more characters in each couplet to make each choice more certain. In addition, I tried to include all names based on New World types, and so the synonymies are extensive and will be useful widely. Specimens wrongly named or placed under synonyms in herbaria are an impediment to rapid and careful taxonomic work.

This book is arranged in part taxonomically, with few exceptions according to the generic arrangement of Crabbe, Jermy, and Mickel (1975), so that related families and genera fall close together (see List of Families, Genera, and Subgenera or Sections). The accepted taxa are given serial numbers and virtually all, except for the late additions, are illustrated to enable the reader, after using the keys, to confirm the identification without reference to a herbarium, although a herbarium should be consulted if one is available. The taxa are arranged alphabetically within the genus (or in large genera, within subgenera) in order to group related taxa and their illustrations together. I have tried to adopt generic concepts that are useable by non-specialists and to avoid both microgenera that are difficult to distinguish (e.g., in the Hymenophyllaceae) and composite genera that contain readily distinguishable and presumably related groups of species that can stand as genera (e.g., in the Polypodiaceae). The family descriptions are not inclusive but concentrate on the characteristics of the genera and species of each family that are found in the Flora area. I have adopted the name Tectariaceae to replace the illegitimate and unconservable Aspidiaceae, which has in addition been used formerly in a much broader and confusing circumscription; the name Pteridaceae, which was incorrect when published because it included types of earlier published family names, but which is correct in a narrow circumscription; and the names Adiantaceae, Dicksoniaceae, and Dryopteridaceae, all of which have recently been accepted for conservation by the Committee for Pteridophyta.

The genera are numbered sequentially throughout the Flora. These numbers are used in the keys to the families and to the genera and also appear in the running heads so the reader can turn readily from the keys to the generic treatments. Likewise, all species and infraspecific taxa are numbered sequentially so that the reader can turn readily from the keys to the text to the illustrations. Those species and infraspecific taxa with a letter following the number are mostly not illustrated.

Illustrations are based on specimens in the U. S. National Herbarium (US), unless otherwise noted by another herbarium acronym. They are based on specimens from the Flora area, unless another country is noted. When the country is designated as Colombia, the specimens illustrated are not from the Chocó. All bar scales are 1 cm long, except as noted. Scales referring to two or more illustrations are centrally placed and have full cross-bars at the ends. Those referring to a single figure are placed near that figure and have half bars at the ends.

Many pteridophytes, because of wide ranges, have accumulated many scientific names. To save space and to prevent this Flora from being unwieldy, I have cited only basionyms in the synonymies, but not transferred names having parenthetical authors. Transferred names, at least for most species, are listed in the "Index Filicum" (Christensen, 1905–1906, 1913, 1917, 1934; Pichi Sermolli et al.,



Map of Panama

1965; Jarrett et al., 1985). Furthermore, I have replaced descriptions of the species and infraspecific taxa with augmented keys; one or more phrases describing the taxon may follow the strictly contrasting information in each portion of the key that leads to a species or other infraspecific taxon. For the same reason, specimens are cited only of the rarest taxa, in order to document their presence in the Flora area. Some of the uncited specimens I have seen are in an unpublished, largely typewritten data base that I used in preparing the Flora.

Literature cited in synonymies conforms largely to standard usage (Lawrence et al., 1968; Stafleu & Cowan, 1976–1988), with some amplifications so that the citations are intelligible without recourse to the standard works. I have included page numbers (but not dates, even if they are different) for some widely held reprints (Mettenius in Triana & Planchon, 1864; K. Presl, 1845a, 1851; Sodiro, 1897) and postprints (Presl, 1843, 1845b, 1847). I have also included some widely held alternate titles, such as Fée's memoir series, Jenman's treatment of the ferns and fern allies of Jamaica, Spring's monograph of *Lycopodium*, and Domin's treatment of the pteridophyta of Dominica.

Types and lectotypes of many early names are based on plates published in three pre-Linnaean works, Plumier's "Traité" (1693), his "Description" (1705), and Sloane's "Voyage" (1707–25). The full titles of these works are cited below.

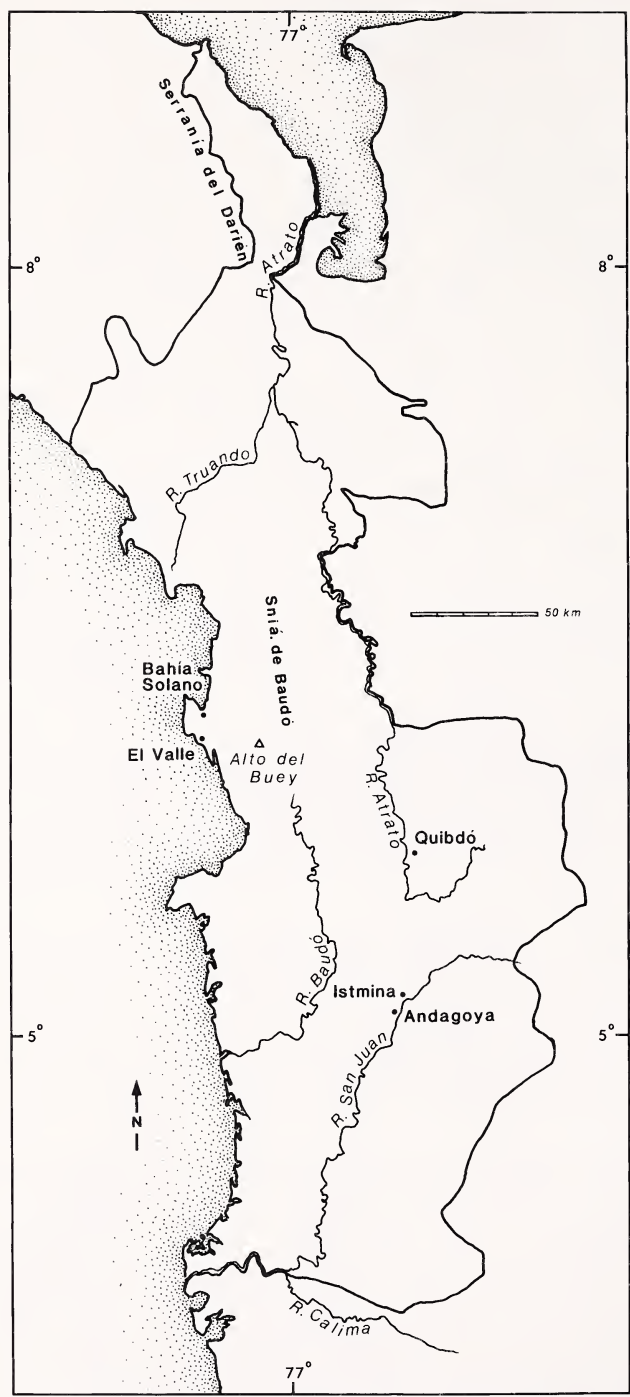
In the citation of specimens (mostly types), the word photo followed by a number refers to the numbered series of photographs taken by C. V. Morton to be found at US and distributed to other herbaria. For the type specimens of many collectors, the usual herbarium of deposit is given, even when I have not seen the specimens.

Because collectors have so frequently revisited a few choice collecting localities, I have placed these localities and the provinces of Costa Rica and Panama on maps (pp. 6, 8, and 10). For these localities, the province is not cited in the discussions but can be learned by examining the maps. Localities in the Flora area are cited from northwestern Costa Rica through eastern Panama to the southern Chocó.

The ranges cited in the discussion are based on herbarium specimens, both old and new. Insofar as collecting has been adequate, they reflect the original range of each taxon in the Flora area. In the more settled areas of this region, the landscape has been virtually entirely altered by agricultural and other activities, and most of the pteridophytes can no longer be found. Their preservation in large, well protected parks and nature preserves appears to be their best chance of survival.

Special literature, mostly relatively recent monographs and revisions, is cited under each genus. Since this work was begun, several general works have been published that I have consulted repeatedly in matters of taxonomy, nomenclature, and plant distribution. These are Kramer (1978), Mickel and Beitel (1988), Proctor (1977, 1985), Smith (1981, 1985), and Stolze (1976, 1981, and 1983).

My fieldwork in the Flora area was supported by the Smithsonian Research Foundation, the National Geographic Society, and the Organization for Tropical Studies. Herbarium visits (to A and GH, CR, DUKE, F, MO, NY, PMA, and UC) were supported by the Smithsonian Institution. Preparation of the illustrations was entirely supported by the Smithsonian Research Foundation and by the



Map of the Chocó

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LIST OF FAMILIES, GENERA, AND SUBGENERA OR SECTIONS

- PSILOTACEAE
1. Psilotum
- LYCOPODIACEAE
2. Lycopodium
 subg. Lycopodium
 subg. Cernuistachys
 subg. Selago
- SELAGINELLACEAE
3. Selaginella
- ISOËTACEAE
4. Isoëtes
- EQUISETACEAE
5. Equisetum
- OPHIOGLOSSACEAE
6. Botrychium
7. Ophioglossum
- MARATTIACEAE
8. Marattia
9. Danaea
- OSMUNDACEAE
10. Osmunda
- PLAGIOGYRIACEAE
11. Plagiogyria
- SCHIZAEACEAE
12. Schizaea
13. Actinostachys
14. Lygodium
15. Anemia
- PARKERIACEAE
16. Ceratopteris
- ADIANTACEAE
17. Llavea
18. Cheilanthes
19. Aleuritopteris
20. Adiantopsis
21. Mildella
22. Notholaena
23. Pellaea
24. Doryopteris
25. Anogramma
26. Pityrogramma
27. Hemionitis
28. Gymnopteris
29. Bommeria
30. Jamesonia
31. Eriosorus
32. Adiantum
- VITTARIACEAE
33. Antrophyum
34. Anetium
35. Hecistopteris
36. Ananthacorus
37. Vittaria
- PTERIDACEAE
38. Pteris
39. Neurocallis
40. Acrostichum
- LOXSOMACEAE
41. Loxsomopsis
- HYMENOPHYLLACEAE
42. Hymenophyllum
 subg. Hymenophyllum
 subg. Leptocionium
 subg. Mecodium
43. Trichomanes
 subg. Achomanes
 subg. Didymoglossum
 subg. Pachychaetum
 subg. Trichomanes
- GLEICHENIACEAE
44. Gleichenia
45. Dicranopteris
- POLYPODIACEAE
46. Pleopeltis
47. Pseudocolysis
48. Microgramma
49. Neurodium
50. Dicranoglossum
51. Niphidium
52. Hyalotrichopteris
53. Campyloneurum
54. Phlebodium
55. Polypodium
 subg. Goniophlebium
 subg. Marginaria
 subg. Polypodium
56. Pecluma
57. Grammitis
 sect. Cryptosorus
 sect. Grammitastrum
 sect. Grammitis
 sect. Xiphopteris
58. Glyphotaeonium
59. Cochlidium
60. Loxogramme

CYATHEACEAE

- 61. Metaxya
- 62. Lophosoria
- 63. Cnemidaria
- 64. Cyathea
- 65. Alsophila
- 66. Sphaeropteris

DICKSONIACEAE

- 67. Dicksonia
- 68. Culcita

DENNSTAEDTIACEAE

- 69. Dennstaedtia
- 70. Costaricia
- 71. Hypolepis
- 72. Paesia
- 73. Pteridium
- 74. Histiopteris
- 75. Lonchitis
- 76. Blotiella
- 77. Saccoloma
- 78. Lindsaea
- 79. Ormoloma
- 80. Odontosoria

THELYPTERIDACEAE

- 81. Thelypteris
 - subg. Amauropelta
 - subg. Cyclosorus
 - subg. Goniopteris
 - subg. Macrothelypteris
 - subg. Meniscium
 - subg. Steiropteris

ASPLENIACEAE

- 82. Asplenium
 - sect. Asplenium
 - sect. Sphenopteris

- 83. Loxoscaphe
- 84. Schaffneria

ATHYRIACEAE

- 85. Athyrium
- 86. Diplazium
 - subg. Anisogonium
 - subg. Diplazium

- 87. Hemidictyum
- WOODSIACEAE

- 88. Cystopteris
- 89. Woodsia

TECTARIACEAE

- 90. Ctenitis

sect. Amplae

sect. Ctenitis

sect. Hirtae

- 91. Megalastrum
- 92. Triplophyllum
- 93. Lastreopsis
- 94. Tectaria
- 95. Cyclopeltis

DRYOPTERIDACEAE

- 96. Didymochlaena
- 97. Polystichum
- 98. Cyrtomium
- 99. Arachniodes
- 100. Polybotrya
- 101. Olfersia
- 102. Maxonia
- 103. Dryopteris
- 104. Cycloodium
- 105. Stigmatopteris

LOMARIOPSIDACEAE

- 106. Bolbitis
- 107. Lomagramma
- 108. Lomariopsis
- 109. Elaphoglossum
 - sect. Amygdalifolia
 - sect. Decorata
 - sect. Elaphoglossum
 - sect. Eximia
 - sect. Lepidoglossa
 - sect. Polytrichia
 - sect. Squamipedia
 - sect. Setosa
 - sect. Undulata

DAVALLIACEAE

- 110. Oleandra

- 111. Nephrolepis

BLECHNACEAE

- 112. Blechnum
 - subg. Blechnum
 - subg. Lomaria

- 113. Salpichlaena

- 114. Woodwardia

MARSILEACEAE

- 115. Marsilea

SALVINIACEAE

- 116. Salvinia

AZOLLACEAE

- 117. Azolla

KEY TO THE FAMILIES

1. Plants bearing expanded fronds (megaphylls) with several vascular strands (reduced to or nearly to often winged stipes with terminal, sporangium-bearing sorophores in some genera of the Schizaceae and to minute, crowded fronds in the aquatic families Azollaceae and Salviniaceae), if grass-like, not bearing a single, large sporangium in a swollen base..6.

1. Plants bearing needle-like or scale-like leaves (microphylls) with a single vascular strand, or the leaves rush-like..2.

2(1). Stems and branches obviously jointed, usually fluted, hollow, often harsh or brittle from silica deposited in the cells; leaves borne in a whorl above a slightly swollen sheath at each node, the tips often scarious and deciduous.

EQUISETACEAE—5. *Equisetum*

2(1). Stems and branches not obviously jointed, rarely fluted or hollow, lacking silica; leaves spirally arranged along the stem or with 2 lateral and 2 smaller, dorsal rows of leaves..3.

3(2). Leaves inconspicuous, scale-like, borne on nearly naked, repeatedly dichotomously branched stems; sporangia tripartite, borne in the axil of a minute sporophyll.

PSILOTACEAE—1. *Psilotum*

3(2). Leaves conspicuous, not scale-like, more or less covering the stems; sporangia not tripartite..4.

4(3). Leaves grass-like, borne in a cluster on a compact, 2- or 3-lobed corm, bearing a single, large sporangium in a swollen base.

ISOËTACEAE—4. *Isoëtes*

4(3). Leaves not grass-like or borne on a corm, not bearing a single, large sporangium in a swollen base..5.

5(4). Sporangia borne in leaf axils along distal portions of the stems or in cylindrical strobili at branch tips; leaves in most species acicular to narrow and monomorphic (equally disposed around the stems), often coriaceous.

LYCOPODIACEAE—2. *Lycopodium*

5(4). Sporangia borne in flattened or quadrangular strobili at branch tips; leaves in most species broad and dimorphic (in 2 lateral and 2 smaller, dorsal rows of leaves), usually membranaceous.

SELAGINELLACEAE—3. *Selaginella*

6(1). Plants epiphytic, epipetric, or terrestrial; if rooted in mud, then more than 30 cm long..10.

6(1). Plants floating in water or sometimes rooted in mud at the edge of ponds or streams or in dried-up pools; plants less than 30(50) cm long..7.

7(6). Laminae at least 6 cm long, pinnately lobed or divided; stipes commonly inflated; laminae dimorphic, the fertile laminae with narrow segments held above the broader, shorter sterile laminae.

PARKERIACEAE—16. *Ceratopteris*

7(6). Laminae less than 6 cm long, not pinnately lobed or divided; stipes obsolete or filiform; laminae monomorphic..8.

8(7). Stipes filiform, several cm long; laminae quadrifid; sporocarps conspicuous, up to ca. 5 mm long, hard, short-stalked, inserted at or near the base of the stipe.

MARSILEACEAE—115. *Marsilea*

8(7). Stipes obsolete; laminae simple, entire; sporocarps inconspicuous, concealed by the laminae..9.

9(8) Laminae on the water's surface oval, mostly 5–15 mm long, with obvious, short hairs on the surface exposed to the air, usually bright green.

SALVINIACEAE—116. *Salvinia*

9(8). Laminae all more or less ovate, mostly less than 1 mm long, lacking hairs on the surface exposed to the air, often reddish, always crowded along repeatedly branched stems.

AZOLLACEAE—117. *Azolla*

10(6). Sporangia fused laterally into elongate or linear, brownish or gray, short-stalked or sessile synangia opening by a double row of pores.

MARATTIACEAE—8. *Marattia* and 9. *Danaea*

10(6). Sporangia discrete, not fused into synangia..11.

11(10). Sporangia small, mostly less than 0.3 mm in diam., delicate, thin-walled, usually brownish at maturity and in age, usually opening into 2 deciduous, irregular portions by the action of a vertical, oblique, or rarely terminal, thick-walled annulus, usually containing 64 spores (leptosporangia), usually on expanded lamina tissue, usually borne in separate groups (sori)..13.

11(10). Sporangia large, mostly more than 0.3 mm in diam., firm, thick-walled, yellowish at maturity, sometimes becoming brownish in age, usually opening into 2 persistent, hemispherical or clamshell-shaped halves without the action of an annulus, usually containing more than 100 spores (eusporangia), usually scattered on naked axes..12.

12(11). Laminae soft, with little supporting tissue, up to 40 cm long, the fertile portion inserted near the base of the sterile portion; sporangia producing thousands of spores.

OPHIOGLOSSACEAE—6. *Botrychium* and 7. *Ophioglossum*

12(11). Laminae firm, with supporting tissue, 50–150 cm long, the fertile portion apical or fertile fronds separate from the sterile ones; sporangia bearing hundreds of spores.

OSMUNDACEAE—10. *Osmunda*

13(11). Plants lacking both hairs and scales. Laminae pinnatisect, dimorphic, the sterile pinnae linear, serrulate toward the acute to acuminate apex, the fertile pinnae narrower, the sporangia in a marginal coenosorus protected by a broad, scarious, continuous, revolute false indusium.

PLAGIOGYRIACEAE—11. *Plagiogyria*

13(11). Plants, or some parts of them, bearing hairs or scales or both..14.

14(13). Sporangia borne in 1 or 2 rows on sorophores terminating grass-like or fan-like fronds (in *Actinotachys* and *Schizaea*) or on the lateral margins of the pinnules of high-climbing fronds (in *Lygodium*) or in 2 rows on dimorphic, branched, elongate, erect pairs of basal pinnae (in *Anemia*); sporangia ovoid or pear-shaped with an apical or oblique, patch-like annulus.

SCHIZAEACEAE—12. *Schizaea*, 13. *Actinotachys*, 14. *Lygodium*, and 15. *Anemia*

14(13). Sporangia not borne on sorophores or specialized basal pinnae..15.

15(14). Laminae membranaceous (1 cell thick between the veins in most species); indusia (involucre) tubular or equally bivalvate.

HYMENOPHYLLACEAE—42. *Hymenophyllum* and 43. *Trichomanes*

15(14). Laminae mostly papery to leathery (at least (2)3 cells thick between the veins); indusia not tubular (except in *Loxomopsis*) or equally bivalvate..16.

16(15). Indusia borne at the ends of broad, marginal teeth, cylindrical or urn-shaped and often slightly constricted at the mouth, ca. 1 mm in diam. and 1.5 mm long.

LOXSOMACEAE—41. *Loxomopsis*

16(15). Indusia not as above..17.

17(16). Sori long or rarely short, in a single continuous or discontinuous line on each side of the costa or costule, protected by a continuous, usually ample, often deciduous, introrse indusium facing the costa or costule.

BLECHNACEAE—112. *Blechnum*, 113. *Salpichlaena*, and 114. *Woodwardia*

17(16). Indusia not as above..18.

18(17). Sori not elongate along the lateral veins or, if so, then not protected by a narrow, usually persistent indusium..20.

18(17). Sori elongate along the lateral veins, on one or both sides of the vein or on one side and hooking over to the other side, protected by a usually persistent, narrow indusium..19.

19(18). Rhizome scales strongly clathrate, the clear lumina readily visible with a hand lens, the cells mostly rather short, 1–2 times longer than wide; plants mostly epiphytic.

ASPENIACEAE—82. *Asplenium*, 83. *Loxoscaphe*, and 84. *Schaffneria*

19(18). Rhizome scales not clathrate, the obscure lumina not readily visible with a hand lens, the cells mostly very long, 3–6 times longer than wide; plants mostly terrestrial.

ATHYRIACEAE—85. *Athyrium*, 86. *Diplazium*, and 87. *Hemidictyum*

20(18). Sporangia organized into discrete sori visible as points or lines, indusiate or exindusiate, dorsal or marginal, the fronds usually monomorphic..25.

20(18). Sporangia apparently or truly acrostichoid, not visible as points or lines, exindusiate (except *Cyclodium* and *Maxonia* in the Dryopteridaceae), partially or fully dimorphic (except *Anetium* in the Vittariaceae and *Cyclodium* in the Dryopteridaceae, and *Llavea*, with a false marginal indusium, in the Adiantaceae), the fertile area confined to specialized fronds or pinnae..21.

21(20). Laminae simple, elliptic or elliptic-oblongate, very thin, with venation reticulate; fronds monomorphic, the sporangia scattered thinly over the abaxial surface of the fertile laminae.

VITTARIACEAE—34. *Anetium*

21(20). Laminae pinnate or more divided; fronds dimorphic, the sporangia scattered thickly over the usually reduced abaxial surface of the fertile laminae..22.

22(21). Sterile laminae coriaceous, the veins a reticulum of elongate hexagons lacking included veinlets; plants terrestrial, usually in swamps or along estuaries or coasts.

PTERIDACEAE—39. *Neurocallis* and 40. *Acrostichum*

22(21). Sterile laminae papery, the veins free, casually anastomosing, or forming an irregular reticulum with included veinlets; plants mostly hemiepiphytic or epiphytic, usually in forests..23.

23(22). Fertile segments linear, incurved, bearing scarious, continuous, marginal false indusia; sterile fronds 2–3-pinnate, the segments ovate-lanceolate, long-stalked.

ADIANTACEAE—17. *Llavea*

23(22). Plants not as above..24.

24(23). Pinnae articulate to a usually narrowly alate rachis or, if the laminae simple or dichotomously branched, the stipes usually articulate near the rhizome; rachises and other axes terete, flattened or grooved, the grooves never provided with short hairs.

LOMARIOPSIDACEAE—106. *Bolbitis*, 107. *Lomagramma*,
108. *Lomariopsis*, and 109. *Elaphoglossum*

24(23). Pinnae not articulate, the rachises exalate; rachises and other axes mostly grooved, the grooves usually provided with short hairs.

DRYOPTERIDACEAE—100. *Polybotrya*, 101. *Olfersia*, and 102. *Maxonia*

25(20). Sori surficial, usually round to elongate, rarely linear (if linear, not in a submarginal groove), not protected by a false indusium..36.

25(20). Sori marginal or nearly so, often elongate or linear, often protected by a reflexed and modified segment margin (false indusium)..26.

26(25). Sporangia borne only on the abaxial surface of the continuous or discontinuous false indusia.

ADIANTACEAE—32. *Adiantum*

26(25). Sporangia never borne on the abaxial surface of the false indusia..27.

27(26). Indusia cup-like, formed by a conspicuous, extrorse true indusium and a modified or unmodified portion of the frond margin.

DICKSONIACEAE—67. *Dicksonia* and 68. *Culcita*

27(26). Indusia not as above..28.

28(27). Indusia extrorse, cup-like or shallow and elongate laterally, marginal or slightly submarginal; frond margins not modified, rarely reflexed.

DENNSTAEDTIACEAE—69. *Dennstaedtia*, 70. *Costaricia*, 77. *Saccoloma*,
78. *Lindsaea*, 79. *Ormoloma*, and 80. *Odontosoria*

28(27). Indusia not as above..29.

29(28). Fronds not simple and linear..32.

29(28). Fronds simple, linear or nearly so. Sori marginal and linear, often in a groove parallel to the margin (the margin sometimes reflexed)..30.

30(29). Sori protected by a linear, scarious, extrorse indusium.

TECTARIACEAE—94. *Tectaria*

30(29). Sori not protected by an extrorse indusium..31.

31(30). Rhizome scales strongly clathrate.

VITTARIACEAE—36. *Ananthacorus* and 37. *Vittaria*

31(30). Rhizome scales not strongly clathrate.

POLYPODIACEAE—49. *Neurodium*

32(29). Plants in aquatic habitats, rooted in mud.

PARKERIACEAE—16. *Ceratopteris*

32(29). Plants not as above..33.

33(32). Fronds several times dichotomously divided, epiphytic.

POLYPODIACEAE—50. *Dicranoglossum*

33(32). Fronds pinnately or pedately divided, usually terrestrial or epipetric..34.

34(33). Fronds usually less than 0.5(0.75) m long, often linear or oblong; stipes commonly wiry, stramineous, dark brown, reddish-brown, or blackish; rhizomes thin, usually short-creeping or multicapital, scaly.

ADIANTACEAE—18. *Cheilanthes*, 19. *Aleuritopteris*, 20. *Adiantopsis*

21. *Mildella*, 23. *Pellaea*, 24. *Doryopteris*, and 30. *Jamesonia*

34(33). Fronds usually at least (0.5)1 m long, commonly deltate and 2–3-pinnate; stipes commonly thick, pale brown; rhizomes thick, long-creeping (short-creeping to erect in *Pteris*), hairy (mixed with scales in *Histiopteris*)..35.

35(34). Rhizomes long-creeping; lamina axes usually provided with short, stout hairs; laminae often dark green (glaucous in *Histiopteris*); sori discontinuous (subcontinuous in *Lonchitis*, continuous in *Histiopteris*).

DENNSTAEDTIACEAE—71. *Hypolepis*, 72. *Paesia*, 73. *Pteridium*,

74. *Histiopteris*, 75. *Lonchitis*, and 76. *Blotiella*

35(34). Rhizomes short-creeping to erect; lamina axes mostly glabrous; laminae often pale to bright green; sori continuous, usually from the sinus to near the apex of the segments.

PTERIDACEAE—38. *Pteris*

36(25). Sori round or nearly so, indusiate or not..43.

36(25). Sori elongate to linear, exindusiate..37.

37(36). Fronds simple, entire to shallowly lobed; sori linear to elongate, often in grooves..40.

37(36). Fronds deeply lobed to pinnate or more divided; sori elongate, rarely linear, never in grooves..38.

38(37). Adaxial surface of the costae (and often the rachis) grooved and provided with short, acicular hairs.

THELYPTERIDACEAE—81. *Thelypteris*

38(37). Adaxial surface of the costae not provided with short, acicular hairs..39.

39(38). Fronds simple or with up to 3 pairs of elliptic lobes; stipes narrowly alate for much of their length.

POLYPODIACEAE—47. *Pseudocolysis*

39(38). Fronds not as above.

ADIANTACEAE—22. *Notholaena*, 25. *Anogramma*, 26. *Pityrogramma*,

27. *Hemionitis*, 28. *Gymnopteris*, 29. *Bommeria*, and 31. *Eriosorus*

40(37). Sori forming elongate, polygonal areolae without included veinlets.

VITTARIACEAE—33. *Antrophyum*

40(37). Sori elongate or linear, but not forming polygonal areolae..41.

41(40). Laminae dimorphic, the fertile ones linear, the sterile ones elliptic-lanceolate.

POLYPODIACEAE—46. *Pleopeltis*

41(40). Laminae monomorphic, linear, oblong, or oblanceolate..42.

42(41). Laminae linear with the sori in several approximate grooves or laminae subflabellate and lacerate at the apex with the sori not in grooves.

VITTARIACEAE—33. *Antrophyum* and 35. *Hecistopteris*

42(41). Laminae not as above.

POLYPODIACEAE—58. *Glyphotaenium*, 59. *Cochlidium*, and 60. *Loxogramme*

43(36). Rhizome an erect, massive (up to ca. 10 cm in diam.) caudex often forming a tree-like trunk, bearing large fronds in a whorl or compressed spiral; sporangia short-stalked, the capsule angular, the annulus oblique.

CYATHEACEAE—61. *Metaxya*, 62. *Lophosoria*, 63. *Cnemidaria*, 64. *Cyathea*, 65. *Alsophila*, and 66. *Sphaeropteris*

43(36). Rhizome erect or not, not massive, never forming a tree-like trunk; sporangia long-stalked, the capsule subspherical, the annulus vertical..44.

44(43). Sori exindusiate..49.

44(43). Sori indusiate, the indusia if deciduous leaving a gap among the sporangia or present as scale-like shreds..45.

45(44). Indusia cup-shaped or scale-like, usually fragmenting or deciduous in age.

WOODSIACEAE—88. *Cystopteris* and 89. *Woodsia*

45(44). Indusia peltate or reniform..46.

46(45). Pinnae articulate to the rachis, often deciduous in age, or laminae simple, the stipes long, wiry, articulate to the rhizome, often with an elongate phyllopodium.

DAVALLIACEAE—110. *Oleandra* and 111. *Nephrolepis*

46(45). Pinnae not articulate to the rachis or deciduous, and laminae not simple, stipes not long, wiry, or articulate to the rhizome..47.

47(46). Rachises adaxially sulcate, the sulcus continuous with the adaxially sulcate costae of the lateral pinnae; edges of the sulcae usually glabrous.

DRYOPTERIDACEAE—96. *Didymochlaena*, 97. *Polystichum*, 98. *Cyrtomium*, 99. *Arachniodes*, 103. *Dryopteris*, 104. *Cyclodium*, and 105. *Stigmatopteris*

47(46). Rachises adaxially terete or, if sulcate, the sulcus not continuous with any adaxially sulcate costae of the lateral pinnae; edges of the sulcae with short to rarely long, multicellular, septate hairs or short, unicellular, needle-like hairs..48.

48(47). Hairs on the adaxial surface of the rachis usually short, unicellular, and acicular; laminae mostly pinnate-pinnatifid, sometimes merely pinnate; vascular bundle above the stipe base one, U-shaped.

THELYPTERIDACEAE—81. *Thelypteris*

48(47). Hairs on the adaxial surface of the rachis rarely short, unicellular, and acicular, often long, multicellular, often septate, rarely absent; laminae often not pinnate-pinnatifid, commonly 2-pinnate or more divided; vascular bundles above the stipe base several.

TECTARIACEAE—90. *Ctenitis*, 91. *Megalastrum*, 92. *Triplophyllum*, 93. *Lastreopsis*, 94. *Tectaria*, and 95. *Cyclopeltis*

49(44). Laminae usually appearing to be dichotomously branched, with pinnatisect or rarely retroflexed ultimate divisions of the fronds and resting buds in the axils of at least some dichotomies. Sporangia always very few (commonly ca. 5–12) in each sorus.

GLEICHENIACEAE—44. *Gleichenia* and 45. *Dicranopteris*

49(44). Laminae rarely appearing to be dichotomously branched, never with resting buds in the axils of some dichotomies..50.

50(49). Fronds pinnate, elongate, recumbent or scrambling on other vegetation, commonly in sunny locations; rachises, and often the costae and costules, sparingly spiny and/or sparsely to densely pubescent and rough to the touch.

DENNSTAEDTIACEAE—71. *Hypolepis*

50(49). Fronds rarely greatly elongate and recumbent or scrambling; axes never spiny..51.

51(50). Laminae simple, pinnatifid, or pinnatisect, often less than 30 cm long.

POLYPODIACEAE—46. *Pleopeltis*, 48. *Microgramma*, 50. *Dicranoglóssum*,
51. *Niphidium*, 52. *Hyalotrichopteris*, 53. *Campyloneurum*, 54. *Phlebodium*,
55. *Polypodium*, 56. *Pecluma*, 57. *Grammitis*, 58. *Glyphotaenium*, and
59. *Cochlidium*

51(50). Laminae pinnate or more divided, usually more than 30 cm long..47.

POLYPODIACEAE—Genera 55. *Polypodium* and 57. *Grammitis*

FLORISTIC TREATMENTS

PSILOTACEAE

Monotypic in the Flora area; see description of *Psilotum*.

1. PSILOTUM Swartz

Plants epiphytic or less commonly epipetric, terrestrial, or on old masonry; rhizomes subterranean, short-creeping, branching, lacking true roots but bearing short, brownish rhizoids; aerial stems loosely clustered, simple at the base, 3–7 times dichotomous distally, flattened or triangular in cross-section; appendages on the stems minute, few, alternate, scale-like, the sterile ones acicular, the fertile ones forked; synangia sessile or nearly so, globular, usually tripartite, yellowish, dehiscing vertically; spores of 1 kind.

Pantropical; 2 species. A primitive genus (and family) not closely related to the true ferns.

COOPER-DRIVER, G. 1977. Chemical evidence for separating the Psilotaceae from the Filicales. *Science* 198:1260–1261.

WAGNER, W. H., Jr. 1977. Systematic implications of the Psilotaceae. *Brittonia* 29:54–63.

1. Stems strongly flattened in cross-section, 1.5–2.5 mm wide. Fronds 3–5 times dichotomous, 15–40 cm long.

1. *P. complanatum*

1. Stems round or angled in cross-section, 0.5–1.5 mm in diam. Fronds 3–7 times dichotomous, 10–35 cm long.

2. *P. nudum*

1. *Psilotum complanatum* Swartz, J. Bot. (Schrader) 1800(2):110. 1801; Syn. Fil. 188, 414, t. 4, f. 5. 1806.

Psilotum complanatum var. *latissimum* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:271. 1849. TYPE LOCALITY: Mexico.

Bernhardia californica K. Muell. Bot. Zeitung (Berlin) 14:222, f. 3–5. 1856. TYPE: California [presumably Mexico], Deppe (B not seen).

Bernhardia schiedeana K. Muell. Bot. Zeitung (Berlin) 14:222, f. 9–11. 1856. TYPE: Hacienda de la Laguna, Jalapa, Edo. Veracruz, Mexico, Schiede (B not seen).

TYPE: Jamaica, Swartz (B-Hb. Willd. 19437 not seen microfiche S. I. Library), according to Proctor (Ferns Jamaica 15. 1985).

Plants epiphytic, in the Flora area known only from the Río Sucio, selvas de Sarapiquí, Pcia. Heredia, 125 m (Gómez 473, CR) and from an unlocalized collection made in Costa Rica (March 1908, Ridgway, US). Also from Cuba, Jamaica, Hispaniola, Mexico to El Salvador, and Venezuela, Colombia, and Peru.

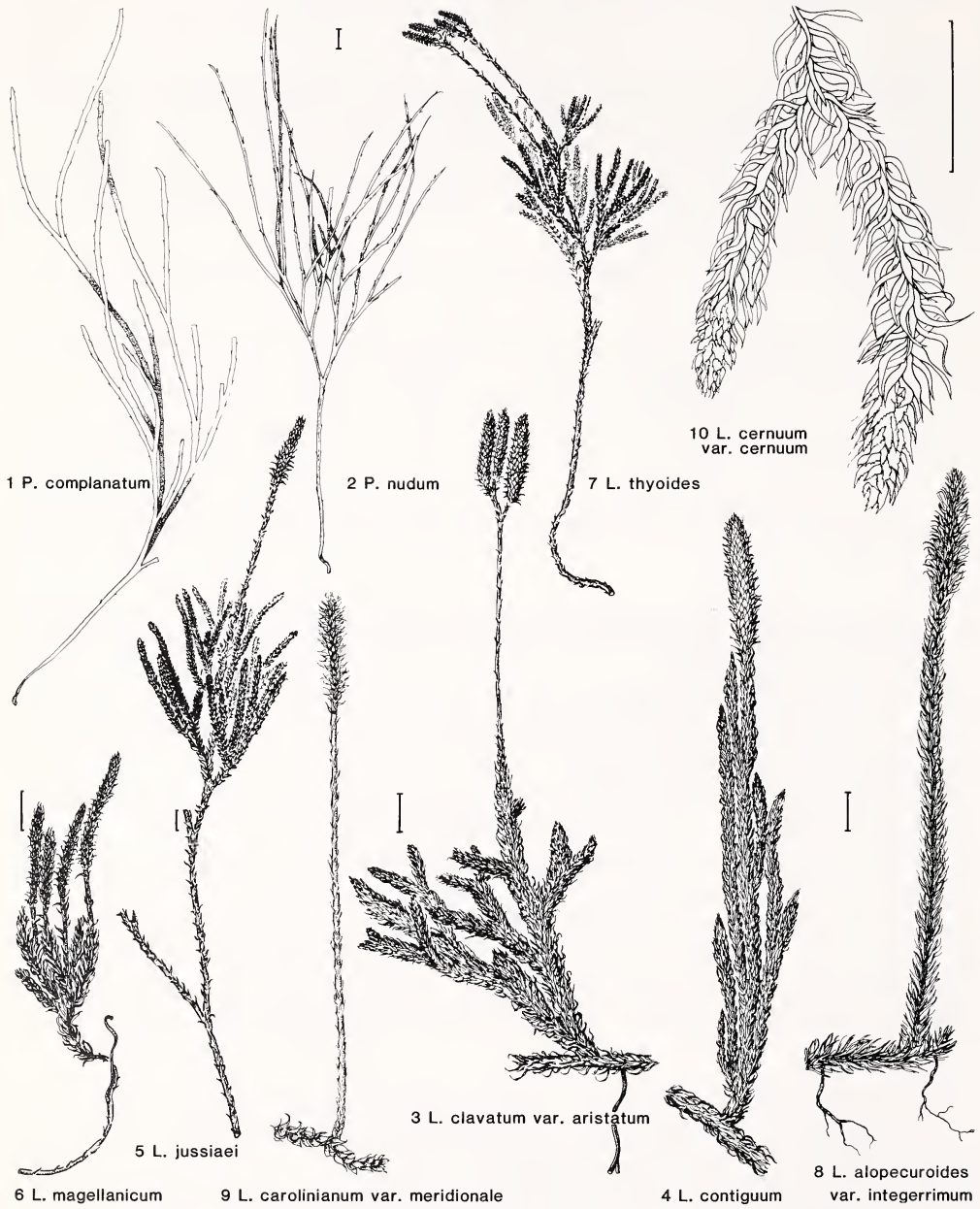
2. *Psilotum nudum* (L.) Pal. Beauv. Prodr. Aethéogram. 112. 1805.

Lycopodium nudum L. Sp. Pl. 2:1100. 1753. TYPE: Based on a specimen with “nudum 2” in the hand of Linnaeus (LINN 1257.1 not seen microfiche S. I. Library).

Hoffmannia aphylla Willd. Mag. Bot. (Römer & Usteri) 2(6):17. 1789, nom. superfl. An illegitimate renaming of *L. nudum* L., and so based on the type of that name.

Psilotum triquetrum Swartz, J. Bot. (Schrader) 1800(2):109. 1801, nom. superfl. TYPE: A renaming of *L. nudum* L., and so based on the type of that name.

Bernhardia dichotoma Willd. ex Bernh. J. Bot. (Schrader) 1800(2):132. 1801, nom. superfl. TYPE: An illegitimate renaming of *L. nudum* L., and so based on the type of that name.



Psilotum floridanum Michx. Fl. Bor.-Amer. 2:281. 1803. TYPE: Florida, Michaux (P not seen), examined by Morton (Amer. Fern J. 57:180. 1967).

Bernhardia antillarum K. Muell. Bot. Zeitung (Berlin) 14:234. 1856. SYNTYPES: Jamaica, Bertero in 1821 (B not seen); Martinique, Sieber Fl. Mart. 58 (B not seen); Trinidad, Sieber Fl. Trin. 200 (B not seen); and Est. Rio de Janeiro, Brazil, Langsdorff (B not seen).

Bernhardia deppeana K. Muell. Bot. Zeitung (Berlin) 14:235. 1856. TYPE: California [presumably Mexico], Deppe (B not seen).

Psilotum domingense Gand. Bull. Soc. Bot. France 66:306. 1919. TYPE: Sto. Domingo, Hispaniola, Bory (P not seen).

Plants epiphytic or epipetric, at 0–100 m elevation, from the Atlantic coastal plain of Costa Rica and Panama. Also throughout tropical America except the Guianas.

FIGS. 1–10. *Psilotum* and *Lycopodium*. FIG. 1. Frond of *P. complanatum*, Ridgway. FIG. 2. Frond of *P. nudum*, Hart 7a. FIG. 3. Plant of *L. clavatum* var. *aristatum*, Lellinger 955. FIG. 4. Plant of *L. contiguum*, Allen 5416. FIG. 5. Plant of *L. jussiaei*, Mickel 3243. FIG. 6. Plant of *L. magellanicum*, Ekman H-13666, Hispaniola. FIG. 7. Plant of *L. thyoides*, Woodruff 29. FIG. 8. Plant of *L. alopecuroides* var. *integerrimum*, Proctor 25304, Guatemala. FIG. 9. Plant of *L. carolinianum* var. *meridionale*, Lehmann 8911, Colombia. FIG. 10. Branch apex of *L. cernuum* var. *cernuum*, Maxon 8351.

LYCOPODIACEAE

Monotypic in this treatment; see description of *Lycopodium*.

2. LYCOPODIUM L.

Plants terrestrial or epiphytic; rhizomes very short and inconspicuous or wide-creeping and conspicuous, provided with tufts of dichotomously branched roots at the nodes and with sparse leaves; aerial stems simple, dichotomously branched, or apparently pinnately branched, usually glabrous, seldom hairy, the leaf-like appendages arranged in a series of spirals, minute or not, 1-nerved, mostly linear, narrowly lanceolate, or narrowly lanceate, all alike or the fertile ones slightly to greatly different, often forming discrete strobili; sporangia axillary, sessile or short-stalked, yellow, reniform or subglobose; spores of 1 kind.

Pantropical with some temperate species; ca. 500 species. The infrageneric taxonomy of this genus has not yet been settled, and many tropical species are poorly known. The subgenera adopted here follow Øllgaard's concepts, which emphasize branching patterns and spore morphology.

ØLLGAARD, B. 1975. Studies in Lycopodiaceae, I. Observations on the structure of the sporangium wall. *Amer. Fern J.* 65:19–27.

———. 1979. Studies in Lycopodiaceae, II. The branching patterns and infrageneric groups of *Lycopodium* sensu lato. *Amer. Fern J.* 69:49–61.

ROLLERI, C. 1981. Sinopsis de las especies de *Lycopodium* L. (Lycopodiaceae: Pteridophyta) de la sección *Crassistachys* Herter. *Revista Museo La Plata, Secc. Bot.*, 13:61–113.

WILCE, J. H. 1972. Lycopod spores, I. General spore patterns and the generic segregates of *Lycopodium*. *Amer. Fern J.* 62:65–79.

1. Rhizomes not wide-creeping; erect or pendent stems regularly dichotomous, usually not forming distinct strobili; spores pitted or grooved (subg. *Selago*)..13.

1. Rhizomes wide-creeping, rooted and bearing erect stems at intervals; erect stems unbranched, pinnately branched, or subdichotomous, usually forming distinct strobili; spores broadly ridged or sharply reticulate..2.

2(1). Erect stems subdichotomously branched, the strobili usually stalked; spores reticulate (subg. *Lycopodium*)..9.

2(1). Erect stems pinnately branched or unbranched, rarely subdichotomously branched, the strobili usually sessile; spores broadly ridged (subg. *Cernuistachys*)..3.

3(2). Erect branches unbranched or subdichotomously branched, up to 20(40) cm long..4.

3(2). Erect branches pinnately branched, often tree-like, up to ca. 100 cm long..5.

4(3). Rhizomes appressed to the soil; strobili solitary on subdichotomously branched erect branches up to 30 cm long; fertile leaves wider than the sterile ones, the strobili stalked, distinct.

9. *L. carolinianum* var. *meridionale*

4(3). Rhizomes arching above the surface of the soil; strobili solitary on unbranched erect branches up to 40 cm long; fertile leaves only slightly different from the sterile ones, the strobili indistinct.

8. *L. alopecuroides* var. *integerrimum*

5(4). Leaves and/or stems decidedly setose; leaves on main stems appressed..7.

5(4). Leaves and stems not setose; leaves on main stems spreading..6.

6(5). Leaves fine, flexible, ca. 0.2 mm wide. Ultimate branches visible between the distant leaves; stems including the leaves 3–6 mm in diam.

10. *L. cernuum* var. *cernuum*

6(5). Leaves coarse, stiff, ca. 0.5 mm wide. Ultimate branches usually obscured by the crowded leaves; stems including the leaves 3–5(7) mm in diam.

12. *L. pendulinum*

7(5). Leaves nearly appressed, imbricate, the stems not visible; ultimate fertile branches 3–8 cm long.

13. *L. riofrioi*

7(5). Sterile leaves spreading and incurved, distant, the stems visible; ultimate fertile branches 0.5–2(3) cm long..8.

8(7). Leaves densely ciliate; largest branchlets including the leaves mostly less than 3 mm wide.

14. *L. trianae*

8(7). Leaves sparsely or not ciliate; largest branchlets including the leaves more than 3 mm wide.

11. *L. cernuum* var. *curvatum*

9(2). Sterile leaves all in many longitudinal rows equally arranged around the stems..11.

9(2). Sterile leaves, at least the larger ones, in 2 longitudinal rows in a single plane..10.

10(9). Leafy branches up to 3.5 mm wide; strobili usually 4 in a group. Fertile leaves in the strobili broadly ovate-lanceolate, 1.5–2 times longer than wide.

7. *L. thyoides*

10(9). Leafy branches 3–6 mm wide; strobili solitary. Fertile leaves in the strobili lanceolate to almost diamond-shaped, 3–4 times longer than wide.

5. *L. jussiaei*

11(9). Leaves acuminate at the apex; rhizomes hypogeous. Upright portions of the plants up to 15 cm long; strobili solitary or paired.

6. *L. magellanicum*

11(9). Leaves with a prolonged, filiform apex; rhizomes hypogeous or epigeous..12.

12(11). Aerial branches widely dichotomous, spreading; strobili several, long-stalked; rhizomes predominantly epigeous.

3. *L. clavatum* var. *aristatum*

12(11). Aerial branches narrowly dichotomous, strictly erect; strobili solitary, sessile; rhizomes predominantly hypogeous.

4. *L. contiguum*

13(1). Sterile leaves not coriaceous, lax to somewhat stiff, ascending, spreading, or recurved away from the stem..21.

13(1). Sterile leaves coriaceous, stiff, strongly ascending (spreading in *L. goudotii*), appressed or incurved along the stem. Sterile leaves ca. (0.5)1 cm long..14.

14(13). Plants terrestrial, erect; leafy stems 5–15 mm in diam., up to 50 cm long..16.

14(13). Plants epiphytic, pendent..15.

15(14). Leafy stems ca. 2 mm in diam., up to 0.5 m long, branched 3–6 times. Sterile leaves ca. 4–5 mm long, 0.2 mm wide, linear; fertile leaves lanceolate, at least 3 times longer than wide.

40. *L. tortile*

15(14). Leafy stems 5 mm in diam., up to 1 m long. Leaves very thick, acicular, appressed or slightly incurved, ca. 8 mm long, 0.75 mm wide, the midrib obscure.

25. *L. uniforme*

16(14). Leaves 4–5 mm long, 3 mm wide, ascending, reddish.

26. *L. goudotii*

16(14). Leaves ca. 1 cm long, usually less than 3 mm wide, strongly ascending, appressed or incurved toward the stem..17.

17(16). Leaves not completely appressed, curved, not crowded, with the stems visible toward the base of the plant, at least in larger specimens..19.

17(16). Leaves completely appressed, straight, crowded, the stems nowhere visible..18.

18(17). Leaves with very small, longitudinal wrinkles on the abaxial surface and with none or only a few low, clear, specialized marginal cells. Leafy stems 10–25 cm long, 5–9 mm wide including the leaves; leaves in probably 8 longitudinal rows, ca. 7.5–10 mm long, 1–1.25(1.5) mm wide, thick, stiff, not keeled, narrowly lanceolate, greenish, yellowish, or reddish.

20. *L. crassum*

18(17). Leaves smooth on the abaxial surface and with occasional, tooth-like, clear, specialized marginal cells. Leafy stems 5–15 cm long, 6–10 mm wide including the leaves; leaves in 12 longitudinal rows, ca. 5–6 mm long, 1 mm wide, rather thick, stiff, not keeled, lanceolate, greenish or yellowish.

19. *L. chiricanum*

19(17). Leaves broadly lanceolate, ca. 6 mm long, 2.5 mm wide, usually distinctly keeled, decidedly spreading, dark olive green, with a wide band of specialized, bulbous marginal cells. Leafy stems 30–40 cm long, 10–17 mm wide including the leaves; leaves apparently in 8 longitudinal rows, rather thick, stiff.

33. *L. pflanzii*

19(17). Leaves narrowly lanceolate, ca. 7–10 mm long, 1–1.5 mm wide, not keeled, somewhat spreading, pale yellowish or greenish, with scattered, specialized, clear, bulbous or tooth-like marginal cells..20.

20(19). Leafy stems 5–15 mm in diam.; leaves in 8–12 longitudinal rows, with few to many specialized, clear, bulbous marginal cells. Leaves narrowly lanceolate, ca. 10 mm long, 1 mm wide, ascending or usually rather spreading and incurved at the tip, thick, stiff, slightly and broadly keeled towards the leaf base, greenish or yellowish, rarely reddish at the apex.

37. *L. saururus*

20(19). Leafy stems 4–6 mm in diam. leaves in ca. 6 longitudinal rows, with a few specialized, clear, tooth-like marginal cells. Leaves lanceolate, ca. 7 mm long, 1.5 mm wide, ascending and nearly straight at the tip, rather thick, stiff, not keeled, yellowish to greenish and usually reddish at the apex.

15. *L. attenuatum*

21(13). Sterile leaves linear to narrowly lanceolate or narrowly lanceolate..24.

21(13). Sterile leaves narrowly oblanceolate, obovate, or elliptical..22.

22(21). Fertile and sterile leaves monomorphic; plants erect. Leaves thin but firm, narrowly oblanceolate, 10–17 mm long, 3 mm wide, the midrib abaxially prominent.

24. *L. foliaceum*

22(21). Fertile and sterile leaves strongly dimorphic; plants pendent..23.

23(22). Stems red; sterile leaves 2.5–5 mm long. Sterile leaves thin, almost translucent, obovate.

21. *L. cuneifolium*

23(22). Stems not red; sterile leaves 5–8 mm long. Sterile leaves thin but firm, nearly elliptical.

22. *L. dichaeoides*

24(21). Largest leafy branches including the leaves 1–2(3) mm wide. Apex of the sterile leaves curved away from the stem, the leaves ca. 3 mm long, 0.2 mm wide, linear; fertile leaves linear-lanceolate.

42. *L. verticillatum* var. *parvifolium*

24(21). Largest leafy branches including the leaves (3)5–30(40) mm wide..25.

25(24). Plants epiphytic (except *L. hippurideum*); leafy branches (3)5–30(40) mm wide..28.

25(24). Plants terrestrial; leafy branches 5–12 mm wide..26.

26(25). Sterile leaves linear, ca. 0.2 mm wide, entire, very crowded, the stems concealed. Sterile leaves thick, not expanded at the base, the midrib obscure.

18. *L. chamaeleon*

26(25). Sterile leaves lanceolate or linear-lanceolate, ca. 0.2–1 mm wide, obscurely toothed, distant, the stems mostly visible..27.

27(26). Stems ca. 1–2 mm in diam. excluding the leaves; leaves 0.5–0.75 mm wide; plants usually 10–25 cm long. Leaves reflexed, spreading, sparingly toothed, the midrib prominent abaxially.

36. *L. reflexum*

27(26). Stems ca. 2–3 mm in diam. excluding the leaves; leaves 1–1.25 mm wide; plants usually 25–40 cm long. Leaves strongly reflexed, very sparsely toothed, the midrib usually not prominent abaxially.

28. *L. hoffmannii*

28(25). Sterile leaves lanceolate to linear-lanceolate, 1–3 mm wide; leaves weakly to strongly dimorphic, the fertile shorter than the sterile ones..36.

28(25). Sterile leaves linear, 0.1–1 mm wide; leaves monomorphic (slightly dimorphic in *L. dichotomum*)..29.

29(28). Sterile leaves 0.2–1 mm wide. Leaves thin, often slightly revolute at the margins and with usually obscure midribs..32.

29(28). Sterile leaves ca. 0.1 mm wide..30.

30(29). Plants (15)25–50 cm long, lax and pendent. Branches mostly more than 5 cm distant along the stems; leaves thin, distant, slightly expanded at the base, the midrib prominent.

43. *L. watsonianum*

30(29). Plants 15(20) cm long, erect..31.

31(30). Leaf bases red. Leaves straight, ca. 10–12 mm long; sporangia 1–1.2 mm wide.

44. *L. wilsonii*

31(30). Leaf bases not red. Branches less than 3 cm distant along the stems; leaves thin, distant, not expanded at the base, curved, ca. 7–8 mm long, the midrib obscure; sporangia ca. 0.8 mm wide.

35. *L. polycarpum*

32(29). Sterile leaves ca. 10 mm long; stems 1–2 mm in diam. excluding the leaves..34.

32(29). Sterile leaves 15–20 mm long; stems ca. 3 mm in diam. excluding the leaves..33.

33(32). Stems red; plants epiphytic. Leaves thin, 20–30 mm long, 0.75 mm wide.

34. *L. pithyoides*

33(32). Stems not red; plants terrestrial. Leaves thin, 15–20 mm long, 1 mm wide.

27. *L. hippurideum*

34(32). Sterile leaves crowded, ascending; fertile leaves slightly dimorphic; stems at least 1 mm in diam. Plants stiff, erect or perhaps occasionally pendent; branches diverging at a 30–40° angle; leaves thin, linear, ca. 10 mm long, 0.75 mm wide.

23. *L. dichotomum*

34(32). Sterile leaves distant, spreading; fertile leaves monomorphic, stems less than 0.5 mm in diam.; plants lax and decidedly pendent..35.

35(34). Stems branched 1–4 times at ca. a 45° angle; stems with the leaves mostly 10–15 mm wide. Leaves thin, arcuate, ca. 10 mm long, 0.75 mm wide.

17. *L. capillare*

35(34). Stems branched 3–6 times at ca. a 20° angle; stems with the leaves mostly 5–10 mm wide. Leaves very thin, straight, keeled, ca. 8 mm long, 0.75 mm wide.

31. *L. mollicomum*

36(28). Sterile leaves at the base of the plant ca. 2–3 mm wide..39.

36(28). Sterile leaves at the base of the plant ca. 1–1.5(2) mm wide..37.

37(36). Sterile leaves ascending at a 30–45° angle to the stem. Sporophylls weakly or rarely strongly dimorphic; sterile leaves linear, crowded, often revolute, 8–12 mm long, 0.3 mm wide.

41. *L. tubulosum*

37(36). Sterile leaves spreading at ca. a 90° angle to the stem..38.

38(37). Plants pendent, 15–60 cm long; leaves strongly dimorphic, the fertile ones shorter; stems often pale pink. Sterile leaves linear, few and distant, 8–12 mm long, 0.75–1 mm wide.

38. *L. subulatum*

38(37). Plants erect, 5–10(15) cm long; leaves monomorphic; stems stramineous. Leaves linear, thick, somewhat distant, slightly revolute at the margins, the midribs prominent abaxially, obscure adaxially.

16. *L. bradeorum*

39(36). Lowest sterile leaves imbricate, stiff, somewhat spreading to strongly ascending. Fertile leaves slightly to strongly dimorphic; sterile leaves thin but stiff, the midribs obscure or prominent only near the base of the leaf.

39. *L. taxifolium*

39(36). Lowest sterile leaves not imbricate, thin, spreading to somewhat ascending..40.

40(39). Fertile leaves ca. 0.5 mm wide; proximal sterile leaves 15–25 mm long, linear-lanceolate. Leaves somewhat dimorphic, the sterile ones thin and flexible, the midribs prominent to the apex.

30. *L. linifolium*

40(39). Fertile leaves ca. 1 mm wide; proximal sterile leaves 7–10 mm long..41.

41(40). Leaves strongly dimorphic; sterile leaves lanceolate, 7–9 mm long, with obscure midribs.

32. *L. myrsinites*

41(40). Leaves essentially monomorphic; sterile leaves elliptic-lanceolate, 8–10 mm long, the midribs prominent nearly to the leaf apex.

29. *L. lancifolium*

LYCOPODIUM subg. LYCOPODIUM

3. *Lycopodium clavatum* var. *aristatum* (Humb. & Bonpl. ex Willd.) Spring, Flora 21(1):173. 1838.

Lycopodium aristatum Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:17. 1810. TYPE: Silla de Caracas, Distr. Fed., Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 19351 not seen; isotype P not seen Tyron photo GH, US).

Lycopodium trichophyllum Desv. Mém. Soc. Linn. Paris 6:184. 1827. TYPE LOCALITY: Brazil. Synonymized by Proctor (Fl. Less. Antill. 2:31. 1977).

Lycopodium aristatum var. *incurvum* Hook. & Grev. Bot. Misc. 2:376. 1831. TYPE: Martinique, *Sieber Fl. Mixt.* 327 (K not seen).

Lycopodium trichiatum var. *desvauxianum* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:92. 1842. TYPE: A renaming of *L. trichophyllum*, and so based on the type of that name.

Lycopodium eriostachys Fée, Crypt. Vasc. Brésil 1:224. 1869. TYPE: Serra dos Orgãos, Est. Rio de Janeiro, Brazil, *Glaziou 1788* (P or RB not seen; isotype BR not seen photo 5215).

Plants terrestrial, at 600–3300 m elevation, on wet banks and cliffs and occasionally in swamps, from the Cordillera Central to Pcia. Chiriquí. Also from the Antilles, Mexico to Venezuela, Bolivia, and Brazil.

I separate as var. *aristatum* the tropical American specimens, which are large and coarse, compared to the north temperate specimens of var. *clavatum*. Variety *aristatum* hybridizes with *L. contiguum* in the northern half of the Cordillera de Talamanca and on Volcán Chiriquí. The hybrids have one or more sessile strobili terminating upright branches, and the rhizomes may be hypogeous or epigeous.

4. *Lycopodium contiguum* Klotzsch, Linnaea 18:519. 1845.

Lycopodium clavatum var. *pseudocontiguum* Christ in Pitt. Prim. Fl. Costaric. 3(1):55. 1901. TYPE: Cerro de las Vueltas, Buena Vista massif, Pcia. S. José, 3000 m, *Pittier 10467* (P not seen; isotype US).

Lycopodium majoris Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:56, f. 11. 1912. TYPE: Trail from Bogotá to the Páramo Cruz Verde, Depto. Cundinamarca, Colombia, ca. 2900 m, *Mayor 17* (S not seen; isotype US).

SYNTYPES: Silla de Caracas, Distr. Fed., Venezuela, *Moritz 224* (B not seen; isotype US); and Pcia. Quito, Ecuador, *Hartweg 1474* (K not seen fragm NY).

Plants terrestrial, at 2200–3500 m elevation, in páramos and occasionally in open areas of cloud forests, from the Cerro de la Muerte to Cerro Copete (Pcia. Chiriquí) and Volcán Chiriquí. Also from Venezuela and Colombia to Bolivia.

This species hybridizes with *L. clavatum* var. *aristatum*; see notes under that variety.

5. *Lycopodium jussiaei* Desv. in Poir. Encyc. Méth. Suppl. 3:543. 1814.

Lycopodium haenkei K. Presl, Reliq. Haenk. 1:78. 1825. TYPE: Huánuco, Pcia. Huánuco, Peru, *Haenke* (PRC not seen).

TYPE: Peru, *Jussieu* (P-Hb. Juss. 658 not seen photos 3247, 3248).

Plants terrestrial, at 2500–2900 m elevation, in bogs and open areas in montane forests, from the Cerro de la Muerte and vicinity. Also from Jamaica, Hispaniola, Venezuela, and Colombia to Bolivia and Brazil.

6. *Lycopodium magellanicum* (Pal. Beauv.) Swartz, Syn. Fil. 180. 1806.

Lepidotis magellanica Pal. Beauv. Prodr. Aethéogram. 102. 1805. TYPE: Straits of Magellan, Chile, *Commerson* (presumably G-Hb. Delessert not seen). A specimen was communicated to Palisot by A. L. de Jussieu, and so there is presumably an isotype in the Jussieu herbarium. However, Hb. Juss. no. 668, labelled “magellan... Commerson” is *L. confertum* Willd., whereas no. 669, without collector or locality and labelled both *L. magellanicum* and *L. confertum*, is true *L. magellanicum*. I suspect that Palisot was sent part of 669, which I assume should bear the same locality and collector as 668.

Plants terrestrial, at 3300–3800 m, in páramos, in the Flora area known only from Cerro Chirripó, Pcia. S. José (*Evans & Lellinger* 182, US). Also from Hispaniola (*Ekman* H13666, US), Argentina, and Chile.

The North American specimens have been confirmed by Dra. Cristina Rolleri, who has made extensive morphological and anatomical studies of the group. This species differs only slightly in aspect from the Andean *L. spurium* Willd.

7. *Lycopodium thyoides* Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:18. 1810.

Lycopodium complanatum var. *tropicum* Spring in Mart. Fl. Bras. 1(2):116. 1840. SYNTYPES: Serra d'Estrella, Est. Rio de Janeiro, Brazil, *Schott* (W not seen); and S. Gonçalo d'Amarante, Est. Piauí, Brazil, *Martius* (M not seen).

Lycopodium complanatum var. *adpressifolium* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:102. 1842, nom. superfl. TYPE: A renaming of *L. complanatum* var. *tropicum*, and so based on the type of that name.

TYPE: Silla de Caracas, Distr. Fed., Venezuela, *Humboldt* (B-Hb. Willd. 19352 not seen fragm NY; isotype P not seen).

Plants terrestrial, at 1800–3400 m elevation, from the Cordillera Central and the Cordillera de Talamasca to Cerro Chirripó. Also from Venezuela and Colombia to Bolivia and Brazil.

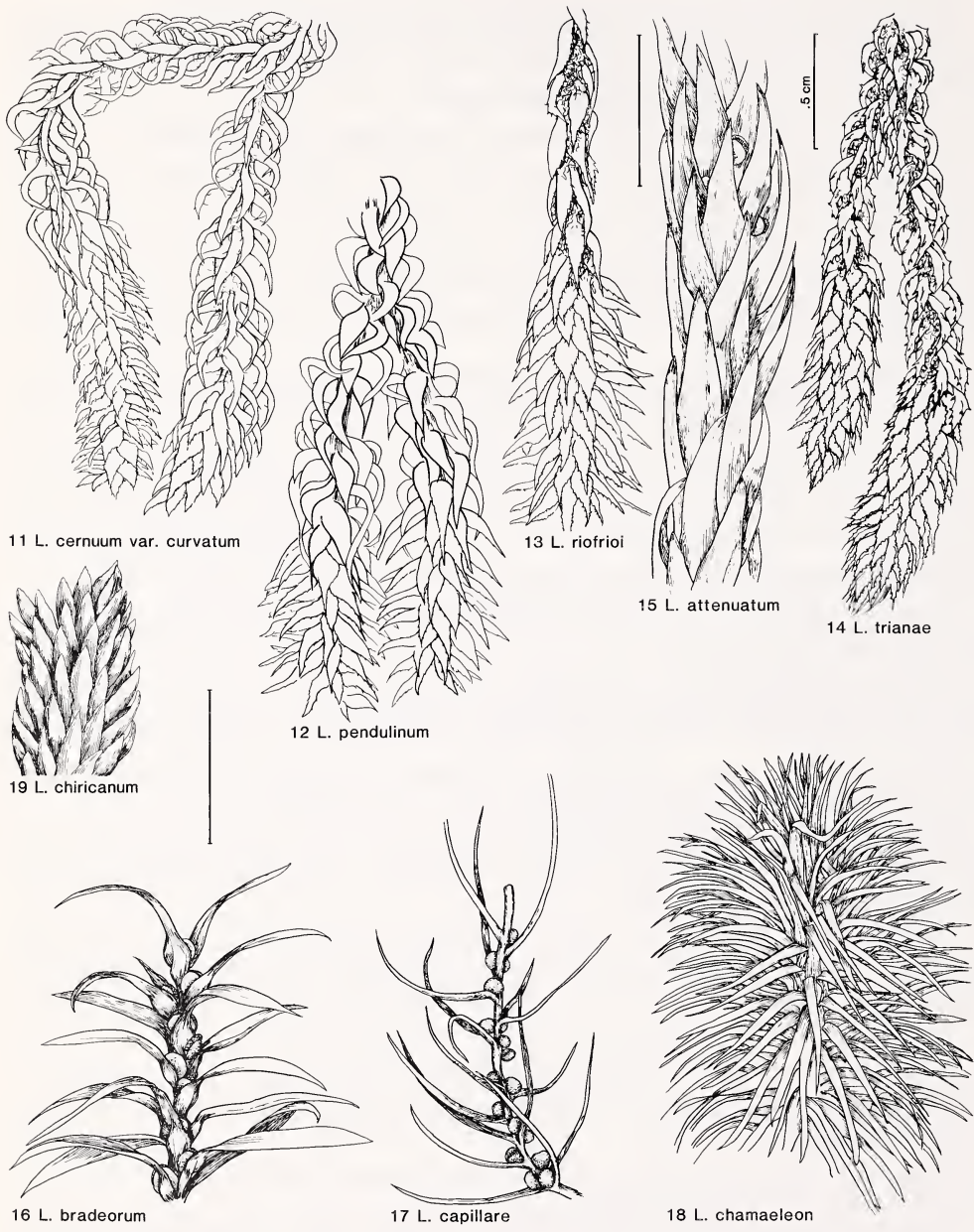
I agree with Wilce (*Beih. Nova Hedwigia* 19:156–158. 1965) that the specimens from the Antilles and those from Mexico to El Salvador represent other, closely related taxa, rather than typical *L. thyoides*.

LYCOPODIUM subg. CERNUISTACHYS Herter**8. *Lycopodium alopecuroides* var. *integerrimum* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:75. 1842.**

Lycopodium longipes Hook. & Grev. Bot. Misc. 2:372. 1831. TYPE: Sta. Catarina Island, Est. Sta. Catarina, Brazil, *Macrae* (K not seen).

TYPE: A renaming of *L. longipes* Hook. & Grev., and so based on the type of that name.

Plants terrestrial, at 1300 m elevation, along wet roadsides, in the Flora area known only from Tapantí (*Sáenz & Nassar* 1450, CR). Also from Cuba, Mexico, Guatemala, Venezuela, Colombia, Ecuador, and Brazil.



9. *Lycopodium carolinianum* var. *meridionale* (Underw. & Lloyd) Nessel & Hoehne, Arch. Bot. São Paulo 1(4):431. 1927.

Lycopodium meridionale Underw. & Lloyd, Bull. Torrey Bot. Club 33:121. 1906. TYPE: Puerto Rico, Wilson 94 (NY not seen).

Plants terrestrial, at 0–100 m elevation, in swampy areas, in the Flora area known only from Quibdó and vicinity. Also from the Antilles, southern Mexico, Guatemala, Belize, Honduras, Nicaragua, and tropical South America.

10. *Lycopodium cernuum* L. Sp. Pl. 2:1103. 1753, var. *cernuum*.

Lycopodium capillaceum Willd. ex Spring, Flora 21(1):165. 1838, nom. illeg. BASED ON: Guanaguana, Edo. Monagas, Venezuela, *Humboldt* 473 (B-Hb. Willd. 19429 not seen microfiche S. I. Library). Invalid because published in synonymy.

Lycopodium cernuum var. *capillaceum* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:80. 1842. TYPE: Based on *L. capillaceum* Willd. ex Spring, and so based on the type of that name.

Lycopodium cernuum var. *panamense* Wercklé ex Nessel, Revista Sudamer. Bot. 6:173, t. XIX, f. 102. 1940. TYPE: Environs of Balboa, Pcia. Panama, *Powell* 1921 (BONN not seen photo US; isotypes P-Hb. Bonaparte, Hb. Wercklé neither seen).

Lycopodium cernuum var. *watsonianum* Nessel, Revista Sudamer. Bot. 6:173, t. XIX, f. 101. 1940. TYPE: Panama, *Biolley* (P-Hb. Beukert, Hb. Christ neither seen).

TYPE: Locality and collector unknown (LINN 1257.13 not seen microfiche S. I. Library).

Plants terrestrial, at 0–2700 m elevation, in disturbed places, throughout Costa Rica and western Panama, but not so common in Pcia. Darién or the Chocó. Also from throughout tropical America.

11. *Lycopodium cernuum* var. *curvatum* (Swartz) Hook. & Grev. Bot. Misc. 2:369. 1831.

Lycopodium curvatum Swartz, J. Bot. (Schrader) 1800(2):116. 1801; Syn. Fil. 178, 402. 1806. TYPE: West Indies, *Swartz* (S not seen).

Plants terrestrial, at 500–2000 m elevation, from Cerro Chompipe (Pcia. Heredia), Alto S. Juan on the road to Dominical (Pcia. S. José), and the summit of Cerro Jefe. Also from Venezuela to Bolivia.

This variety resembles *Lycopodiella camporum* Øllgaard & Windisch.

12. *Lycopodium pendulinum* Hooker, Icon. Pl. 1:t. 90. 1837.

Lycopodium cernuum f. *macrostachyum* Christ in Pitt. Prim. Fl. Costaric. 3(1):55. 1901. TYPE: Achote, Volcán Poás, Pcia. Heredia, 2300 m, *Tonduz* 10692 (P? not seen; isotypes CR, US).

Lycopodium cernuum var. *pendulinum* (Hook.) Nessel, Bärlappgewächse 367. 1939, as “*pendulum*” and incorrectly attributed to Hooker.

TYPE: Casapí, Pcia. Huánuco, Peru, *Mathews* 1776 (K not seen fragm US).

Plants terrestrial, at 2200–2700 m elevation, from the Cordillera Central and the Cordillera de Talamanca to Cerro Arizona above Sta. Fé. Also from Venezuela and Colombia to Bolivia.

FIGS. 11–19. *Lycopodium*. FIG. 11. Branch apices of *L. cernuum* var. *curvatum*, Standley & Valerio 52083. FIG. 12. Branch apices of *L. pendulinum*, Tonduz 10692. FIG. 13. Branch apex of *L. riofrio*, Woodruff. FIG. 14. Branch apices of *L. trianae*, Killip 35353. FIG. 15. Branch portion of *L. attenuatum*, Scamman 7804. FIG. 16. Branch portion of *L. bradeorum*, Standley & Valerio 50389. FIG. 17. Branch portion of *L. capillare*, Johnson 917, Guatemala. FIG. 18. Branch apex of *L. chamaeleon*, Standley & Valerio 52083. FIG. 19. Branch portion of *L. chiricanum*, Maxon 5364.

This species and *L. riofrioi* have pendulous fertile branch tips.

13. *Lycopodium riofrioi* Sodiro, Anal. Univ. Quito 12(81):337 (repr. 582). 1895.

Lycopodium pensum Lellinger & Mickel in Lellinger, Proc. Biol. Soc. Wash. 89:717, f. 2. 1977. TYPE: 6 mi. from S. Rafael de Heredia on the slopes of Volcán Barba, Pcia. Heredia, *McAlpin* 216 (DUKE fragm GH).

TYPE: Gualea, Pcia. Pichincha, Ecuador, *Sodiro* (not seen).

Plants terrestrial, at 1700–2000 m elevation, from Volcán Barba and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Venezuela, Colombia, and Ecuador.

14. *Lycopodium trianae* Hieron. Bot. Jahrb. Syst. 34:574. 1905.

Lycopodium cernuum var. *trianae* (Hieron.) Nessel, Bärappgewächse 358. 1939, attributed erroneously to Hieronymus.

LECTOTYPE: Arrostradero, Depto. Chocó, 2500 m, *Triana* 234 (B not seen; isoelectotypes NY, US), chosen by Nessel (Bärappgewächse 359. 1939).

Plants terrestrial, at 0–800 m elevation, in disturbed areas in lowland rain forests and second-growth forests, from the Río S. Juan basin. Also from Pacific coastal Colombia south to Depto. Nariño.

LYCOPODIUM subg. SELAGO Baker

15. *Lycopodium attenuatum* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:8. 1849.

Lycopodium tobari Sodiro, Anal. Univ. Quito 12(81):320 (repr. 565). 1895. SYNTYPES: Cerro de Puntas, Ecuador, *Sodiro* (Hb. Sodiro not seen) and Mt. Pichincha, Ecuador, 3400 m, *Sodiro* (Hb. Sodiro not seen).

LECTOTYPE: Mt. Pichincha, Pcia. Pichincha, Ecuador, 11,500 ft, *Hartweg* 1470 (US; isoelectotype B not seen fragm NY, K not seen fragm NY), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:717. 1977).

Plants terrestrial, at 3100–3400 m elevation, in páramos, from the Cerro de la Muerte. Also from Colombia and Ecuador.

16. *Lycopodium bradeorum* Christ, Repert. Spec. Nov. Regni Veg. 8:20. 1910.

?*Lycopodium brauseanum* Herter in Urban, Symb. Antill. 7:165. 1912. TYPE: Mt. S. Juan, Venezuela, 600 m, *J. R. Johnston* 156 p. p. (GH not seen).

TYPE: La Palma, Pcia. S. José, 1400 m, *Brade & Brade* 282 (P not seen photo 22346; isotypes UC, US).

Plants epiphytic, at 1000–2400 m elevation, from the Cordillera Central and from near Boquete. Also from Guatemala, El Salvador, Nicaragua, Venezuela, and Ecuador.

This is a species that is very distinct in aspect, resembling a young *Taxus* or *Cryptomeria* plant.

17. *Lycopodium capillare* Sodiro, Recens. Crypt. Vasc. Quit. 90. 1883.

Lycopodium sarmentosum var. *rubescens* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:13. 1849. TYPE: Depto. Cauca, Colombia, *Hartweg* 1464 (BR not seen; isotype fragment US).

Lycopodium underwoodianum Maxon, Contr. U. S. Natl. Herb. 13:41, t. 9. 1909. TYPE: Coliblanco, on the lower slopes of Volcán Turrialba, Pcia. Cartago, ca. 1950 m, *Maxon* 213 (US; isotypes CR, NY).

Lycopodium guatemalense Maxon, Contr. U. S. Natl. Herb. 17:177, t. 9A. 1913. TYPE: Pansamalá, Depto. Alta Verapaz, Guatemala, ca. 1200 m, *von Tuerckheim 957* (US).

TYPE: Hacienda Guanaxilla, Pcia. Pichincha, Ecuador, 400 m, *Sodi* (K not seen).

Plants epiphytic, at (1000)1500–2400 m elevation, from the Cordillera Central, the vicinity of Boquete, and Cerro Mali (Pcia. Darién). Also from southern Mexico, Guatemala, Venezuela, Colombia, Ecuador, and southern Brazil.

18. *Lycopodium chamaeleon* (Herter) Morton, Amer. Fern J. 54:72. 1964.

Urostachys chamaeleon Herter, Amer. Fern J. 48:82. 1958. TYPE: Barranca Grande, near S. Marcos, Pcia. S. José, Feb 1926, *O. Jiménez* (US).

Plants terrestrial, at ca. 1500–2400 m elevation, on wet banks, from between Volcán Barba and Volcán Turrialba and from the type locality.

This species could be mistaken for *L. reflexum*, but its leaves are narrower and more crowded and completely conceal the stems, except at the base of the plant. When found growing together, these two species do not hybridize (R. Faden in litt. 22 Dec 1965).

19. *Lycopodium chiricanum* Maxon, Contr. U. S. Natl. Herb. 17:176, t. 8. 1913.

TYPE: Summit of Volcán Chiriquí, Pcia. Chiriquí, ca. 3370 m, *Maxon 5364* (US fragm NY).

Plants terrestrial, at 3000–3300 m elevation, in montane forests and open areas, from Volcán Turrialba and Volcán Chiriquí.

20. *Lycopodium crassum* Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:50. 1810.

Lycopodium erythraeum Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:7. 1849. SYNTYPES: Sierra Nevada, Edo. Mérida, Venezuela, 10,000 ft, *Linden 569* (BR not seen); Andes of Ecuador, 14,000 ft, *Jameson* (K not seen); and Mt. Antisana, Pcia. Pichincha, Ecuador, *Hartweg* (BR? not seen).

Urostachys crassus var. *herteri* Nessel, Repert. Spec. Nov. Regni Veg. 36:180, t. 171. 1934. TYPE: Mt. Antisana, Pcia. Pichincha, Ecuador, *Hartweg 1472* (Hb. Lawory, Hb. Beukert not seen; isotypes BM? and BR? neither seen).

Urostachys kupperi Nessel, Repert. Spec. Nov. Regni Veg. 36:180, t. 176. 1934. TYPE: Volcán de Pasto, Depto. Nariño, Colombia, 3500–4000 m, *Hartweg 1474b* (P not seen).

Urostachys moritzii Herter ex Nessel, Revista Sudamer. Bot. 6:160, t. 9, f. 29. 1940. TYPE: Sierra Nevada, Edo. Mérida, Venezuela, *Greven 61* in 1898 (Hb. Greven not seen).

Urostachys orionis Herter, Ind. Lycopod. 73. 1949, nom. superfl. TYPE: A renaming of *U. moritzii* Greven ex Herter, and so based on the type of that name.

Urostachys bonae-voluntatis Herter, Revista Sudamer. Bot. 10:112. 1953. TYPE: Mt. Mojanda, Pcia. Pichincha, Ecuador, *Mille 95* (US).

Urostachys bonae-voluntatis var. *minor* Herter, Revista Sudamer. Bot. 10:113. 1953. TYPE: Between Quebrada de S. Paulino and Quebrada de Lopez, Lagunilla de las Casitas, western slopes of the Cordillera Central, Depto. Cauca, Colombia, *Cuatrecasas 19085a* (US).

Lycopodium nesselianum Duek & Lellinger, Amer. Fern J. 68:120. 1978. TYPE: A renaming of *Urostachys moritzii* Greven ex Herter non *Lycopodium moritzii* Muell. (Bot. Zeit. 19:65. 1861), and so based on the type of that name.

TYPE: Mt. Antisana near Chusslongo, Pcia. Pichincha, Ecuador, 2218 hexap, *Humboldt 2263* (B-Hb. Willd. 19417 not seen Tryon photo).

Plants terrestrial, at 3000–3700 m elevation, in páramos, from the Cerro de las Vueltas and Cerro Chirripó. Also from Venezuela to Peru.



21. *Lycopodium cuneifolium* Hieron. Bot. Jahrb. Syst. 34:572. 1905.

Lycopodium aqualupianum var. *obtusifolium* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:31. 1849. TYPE LOCALITY: Colombia.

SYNTYPES: Volcán Barba, Pcia. Heredia, *Hoffmann* 50 (B not seen fragm US); and near Mérida, Edo. Mérida, Venezuela, *Moritz* 371 (B not seen).

Plants epiphytic, at 1500–2400(3000) m elevation, mostly in lower montane forests, from the Cordillera Central to near Copey de Dota (Pcia. S. José) and from the Cerro de la Horqueta (Pcia. Chiriquí). Also from Venezuela and Colombia.

This species resembles *L. dichaeoides*, but has smaller sterile leaves and reddish stems.

22. *Lycopodium dichaeoides* Maxon, Proc. Biol. Soc. Wash. 18:231. 1905.

TYPE: Near Finca Sepacuité, Depto. Alta Verapaz, Guatemala, *Cook & Griggs* 251 (US).

Plants epiphytic, at (800)1100–2100 m elevation, in forests, from the Cordillera Central to the Serranía del Darién. Also from Guatemala, Honduras, Nicaragua, Colombia, and Ecuador.

This species resembles *L. cuneifolium*, but has larger sterile leaves and stramineous stems. It may hybridize with that species in Pcia. Darién.

23. *Lycopodium dichotomum* Jacq. Enum. Stirp. Vindob. 314. 1762.

Lycopodium gramineum Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:19. 1849. TYPE: Guayaquil, Pcia. Guayas, Ecuador, *Jameson* 29 (K not seen fragm NY).

Lycopodium barbatum Christ, Bull. Herb. Boissier II, 5:254. 1905, non Kaulf., 1824. TYPE: Costa Rica, *Wercklé* in 1904 (P not seen; isotype US).

Lycopodium chamaepeuce Herter, Bot. Jahrb. Syst. 43, Beibl. 98:50. 1909. TYPE LOCALITIES: Guadeloupe and French Guiana.

Urostachys chamaepeuce var. *urbanicus* Herter, Repert. Spec. Nov. Regni Veg. 19:164. 1923. SYNTYPES: Grenada, *Broadway* 3457 p. p. (B not seen; isotype fragm US as 3275) and 3458b (B not seen).

Urostachys mortonii Herter in F. Morton, Repert. Spec. Nov. Regni Veg. 28:108. 1930. SYNTYPES: Hacienda de Chocolá, Depto. Mazatenango, Guatemala, 820 m, *Morton* 225a and 284a (B neither seen).

Urostachys lindeneri Herter ex Nessel, Revista Sudamer. Bot. 6:164, t. 50. 1940. TYPE: Chilion, near Mazatenango, Depto. Suchitepéquez, Guatemala, *Bernouilli & Cario* 1866 (P-Hb. Christ not seen).

Urostachys schlehtendalii Nessel, Revista Sudamer. Bot. 6:164, t. 11, f. 51. 1940. TYPE: Guaveyma, Mexico, 5000 ft, *Wagner* 1849 (Hb. Beukert, Hb. Merson neither seen).

LECTOTYPE: Plate 45 in volume 3 of Jacquin's "Hortus Botanicus Vindobonensis," which illustrates a plant from Martinique, chosen by G. R. Proctor (Fl. Less. Antill. 2:28. 1977).

FIGS. 20–27. *Lycopodium*. FIG. 20. Sterile branch portion of *L. crassum*, Evans & Lellinger 143. FIG. 21. Sterile and fertile branch portion of *L. cuneifolium*, Brade & Brade (Ros. Fil. Costar. Exs. 125). FIG. 22. Sterile and fertile branch portion of *L. dichaeoides*, Cook & Doyle 70, Guatemala. FIG. 23. Branch tip of *L. dichotomum*, Standley 26116. FIG. 24. Branch portion of *L. foliaceum*, Standley & Valerio 49706. FIG. 25. Branch portion of *L. funiforme*, Skutch 3731. FIG. 26. Branch portion of *L. goudotii*, Goudot 3, Colombia. FIG. 27. Branch portion of *L. hippurideum*, Allen 4890.

Plants epiphytic, at 0–1200(2500?) m elevation, in forests, from throughout the Flora area, but mostly from the Cordillera de Tilarán, the Cordillera Central, and central Panama. Also from Florida, the Antilles, and Mexico to Brazil.

24. *Lycopodium foliaceum* Maxon, Smithsonian Misc. Collect. 56(29):1, t. 1. 1912.

TYPE: Upper Caldera River, Holcomb's Trail above Boquete, Pcia. Chiriquí, ca. 1650 m, *Maxon 5628* (US; isotype NY).

Plants epiphytic, at 1000–2400 m elevation, from the Cordillera Central to Boquete.

25. *Lycopodium funiforme* Cham. ex Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:50. 1842.

SYNTYPES: "California," *Chamisso* (P-Hb. Bory not seen), presumably an incorrect reference; and Guadeloupe, *L'Herminier* (P not seen).

Plants epiphytic, at 0–2000 m elevation, in forests, from scattered localities in Costa Rica and Panama, and from La Trojita, Río Calima, Depto. Valle (*Cuatrecasas 16553*, US). Also from the Antilles and Venezuela to Guyana.

The earlier publication of *L. funiforme* Bory ex Brongn. (*Hist. Vég. Foss.* 2:10, 18, t. 7, f. 9. 1837) is often cited, but is not valid. There was no intent to describe a new species; the description, in a discussion of phyllotaxy, is incidental and not diagnostic, and the illustration lacks analyses.

26. *Lycopodium goudotii* Herter, Bot. Jahrb. Syst. 43, Beibl. 98:47. 1909.

TYPE: Bogotá, Distr. Esp., Colombia, *Goudot?* in 1844 (G not seen; isotype P not seen Øllgaard photo).

Plants terrestrial, at 3600 m elevation, in páramos, in the Flora area known only from Cerro Crestones, Chirripó Massif, Pcia. S. José (*Gómez 7270*, CR). Also from Colombia and Peru.

➤ **27. *Lycopodium hippurideum* Christ in Pitt. Prim. Fl. Costaric. 3(1):56. 1901.**

Lycopodium lechleri Hieron. Bot. Jahrb. Syst. 34:571. 1905. LECTOTYPE: Near Tabina, Depto. Puno, Peru, *Lechler 2012* (B not seen photo US).

TYPE: El Páramo, Buena Vista massif facing east, Pcia. Cartago, *Pittier 10619* (P not seen; isotypes CR, US fragm NY).

Plants terrestrial, at (1200)2300–3300 m elevation, in montane (mostly oak) forests and occasionally in páramos, from the Cordillera Central, the Cordillera de Talamanca to Cerro Chirripó, and Volcán Chiriquí. Also from Hispaniola, Mexico, Guatemala, El Salvador, Venezuela, and Colombia to Bolivia.

This species closely resembles *L. pithyoides* in its habit, but not its habitat.

28. *Lycopodium hoffmannii* Maxon, Contr. U. S. Natl. Herb. 17:423. 1914.

TYPE: Volcán Barba, Pcia. Heredia, *Hoffmann 85* (US; isotype B not seen fragm NY).

Plants terrestrial, at 2000–3300 m, on wet banks, from the Cordillera Central, Cerro de las Vueltas, and Pcia. Chiriquí.

This species resembles *L. reflexum* in habit, but as a rule has larger, usually longer stems and wider leaves. It may hybridize with *L. reflexum*.

29. *Lycopodium lancifolium* Maxon, Contr. U. S. Natl. Herb. 17:177. 1913.

TYPE: Upper Caldera river, Holcomb's Trail above Boquete, Pcia. Chiriquí, ca. 1650 m, *Maxon 5627* (US fragm NY).

Plants epiphytic, at 1500–2000 m elevation, in the Flora area known only from the type locality and from El Alto de La Palma, Pcia. S. José (*Horich U. C. Bot. Gard. 58.201*, US).

This species is related to *L. linifolium* and *L. taxifolium* but has essentially monomorphic, wider leaves than those species.

30. *Lycopodium linifolium* L. Sp. Pl. 2:1100. 1753.

Lycopodium linifolium var. *laxum* Fée, Hist. Foug. Antill. [Mém. Foug. 11]:129. 1866. TYPE: Mexico, *Schaffner 124* (P? not seen).

Lycopodium pittieri Christ, Bull. Soc. Bot. Genève II, 1:236. 1909. TYPE: Cocos Island, *Pittier 12357* (P not seen; isotype US).

Lycopodium linifolium var. *subaristatum* Christ, Bull. Soc. Bot. Genève II, 1:236. 1909. SYNTYPES: Costa Rica, *Wercklé* (P not seen); and Tablazo, Pcia. S. José, 1900 m, *Brade & Brade 228* (P not seen), synonymized by Gómez (*Brenesia 12/13:76*. 1977).

LECTOTYPE: Plate 166, figure C, of Plumier's "Traité...", chosen by Proctor (*Fl. Less. Antill. 2:26*. 1977).

Plants epiphytic, at 0–900(2200) m elevation, in mostly lowland forests throughout the Flora area. Also throughout tropical America.

This species is said to be called "Ciprecillo" and to be a remedy for snake bites (*Standley & Valerio 45143*, US).

31. *Lycopodium mollicomum* (Mart. ex Spring) Spring in Mart. Fl. Bras. 1(2):113. 1840.

Lycopodium dichotomum subsp. *mollicomum* Mart. ex Spring, Flora 21(1):162. 1838. TYPE LOCALITY: Brazil.

Lycopodium flaccidum sensu Fée, Crypt. Vasc. Brésil 2:92, t. 106, f. 1. 1873, non Bory in Bél., 1834. TYPE: Alto Macahé, Est. Rio de Janeiro, Brazil, *Glaziou 4677* (presumably P not seen).

Urostachys neptunei Herter, Ind. Lycopod. 72. 1949. TYPE: A renaming of *L. flaccidum* sensu Fée, and so based on the type of that name.

Lycopodium williamsii Underw. & Lloyd, Bull. Torrey Bot. Club 33:112. 1906. TYPE: New Brazil, Bolivia, 5500 ft, *Williams 1393* (NY not seen).

Plants epiphytic, at 1200–1900 m elevation, from the Cordillera Central and the valley of the Río Grande de Orosi (Pcia. Cartago). Also from tropical South America.

32. *Lycopodium myrsinites* Lam. Encyc. Méth. 3:654. 1789.

Lycopodium roraimense Underw. & Lloyd, Bull. Torrey Bot. Club 33:115. 1906. TYPE: Forest slopes near Roraima, Guyana, *Jenman* (NY not seen).

Lycopodium skutchii Maxon, Proc. Biol. Soc. Wash. 46:159. 1933. TYPE: Chichavac, Depto. Chimaltenango, Guatemala, 2400–2700 m, *Skutch 243* (US).

TYPE: Hispaniola, *comm. J. Martin* (P-Hb. Lam not seen).

Plants epiphytic, at (300)1600–3000 m elevation, in forests, from the Cordillera Central, the northern end of the Cordillera de Talamanca, and the Fila de Cedral. Also from Hispaniola, Mexico to Honduras, and Venezuela to Peru and Guyana.

This species is related to *L. dichaeoides*, but differs in its lanceolate leaves that are acute at the apex.



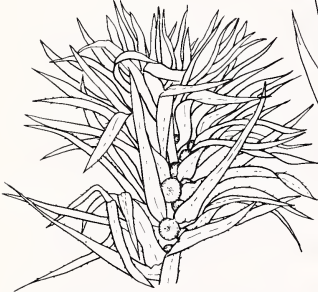
28 *L. hoffmannii*



29 *L. lancifolium*



34 *L. pithyoides*



36 *L. reflexum*



31 *L. mollicomum*



35 *L. polycarpum*



33 *L. pflanzii*



32 *L. myrsinites*



30 *L. linifolium*

33. *Lycopodium pflanzii* (Nessel) Lellinger, Proc. Biol. Soc. Wash. 89:717. 1977.

Urostachys pflanzii Nessel, Repert. Spec. Nov. Regni Veg. 36:181, t. 171. 1934. SYNTYPES: Near Corocoro, Depto. La Paz, Bolivia, *Pflanz* in 1920 (Hb. Nessel not seen; isotype fragm US ex Hb. Bodino, Milan); and S. Benito, Sacaba, Depto. Cochabamba, Bolivia, 3000–4000 m, 14 Nov 1921, *Steinbach* (B not seen).

Plants terrestrial, at 3100–3200 m elevation, in páramos, in the Flora area known only from the Cerro de la Muerte ca. 22 km north of S. Isidro del General, Pcias. Cartago and S. José (*Tryon & Tryon 7055*, GH). Also from Bolivia.

It is possible, according to B. Øllgaard (pers. comm.), that this plant is not conspecific with Bolivian *L. pflanzii*.

34. *Lycopodium pithyoides* Schlechtend. & Cham. Linnaea 5:623. 1830.

Lycopodium mandioccanum var. *mexicanum* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:45. 1842. TYPE: A renaming of *L. pithyoides* Schlechtend. & Cham., and so based on the type of that name.

Lycopodium gigas Herter, Bot. Jahrb. Syst. 43, Beibl. 98:50. 1909. SYNTYPES: Southern Mexico, collector unknown (not seen); and St. Yago, Libani, Cuba, *Linden 1996* (P not seen; isosyntype K not seen), synonymized by A. R. Smith (Fl. Chiapas 2:254. 1981).

TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede & Deppe* (B or HAL not seen).

Plants epiphytic, at 1200–1900(2700) m elevation, in forests, from the Fila de Cedral, Las Cóncevas (Pcia. Cartago), and the northern end of the Cordillera de Talamanca. Also from Cuba, Hispaniola, Mexico to Honduras, and Venezuela.

35. *Lycopodium polycarpum* Kunze, Linnaea 9:5. 1834.

Urostachys cuatrecasasii Herter, Revista Sudamer. Bot. 10:123. 1953. TYPE: Río Digua, Depto. El Valle, Colombia, 900–1180 m, *Cuatrecasas 15143A* (US).

TYPE: Near Casapí, Depto. Huánuco, Peru, *Poeppig Diar. 1124* (LZ destroyed).

Plants epiphytic, at (100)600–2000(2400) m elevation, from the Cordillera de Tilarán, the Cordillera Central, the vicinity of Guápiles (Pcia. Limón), the Cordillera de Talamanca to Pcia. Veraguas, and the Río Salaquí (Depto. Chocó). Also from Jamaica, Puerto Rico, the Lesser Antilles, and Colombia.

This species differs from *L. wilsonii* in having shorter, falcate-ascending leaves and more crowded, thinner, shorter stems.

36. *Lycopodium reflexum* Lam. Encyc. Méth. 3:653. 1789, var. *reflexum*.

Lycopodium squarrosus Swartz, Nov. Gen. Sp. Pl. Prodr. 137. 1788, non Forst., 1786, nom. illeg. TYPE: Jamaica, *Swartz* (S not seen).

Lycopodium reflexum Willd. Sp. Pl. ed. 4, 5:52. 1810, non Lam. 1789, nom. illeg. TYPE: Volcán Tungurahua, Pcia. Tungurahua, Ecuador, *Née* (B-Hb. Willd. 19419 not seen Tryon photo).

Lycopodium bifidum Humb. & Bonpl. ex Willd. Sp. Pl. ed 4, 5:53. 1810. TYPE: Cuchilla de Guanaguana, Edo. Monagas, Venezuela, 3288 ft, *Humboldt 474* (B-Hb. Willd. 19421 not seen microfiche S. I. Library).

FIGS. 28–36. *Lycopodium*. FIG. 28. Branch apex of *L. hoffmannii*, Valerio 2. FIG. 29. Branch portion of *L. lancifolium*, Maxon 5627. FIG. 30. Branch portion of *L. linifolium*, Svenson 324. FIG. 31. Branch portion of *L. mollicomum*, Maxon 8280. FIG. 32. Sterile and fertile branch portion of *L. myrsinites*, Skutch 1054, Guatemala. FIG. 33. Branch portion of *L. pflanzii*, Tryon & Tryon 7055 (GH). FIG. 34. Branch portion of *L. pithyoides*, von Tuerckheim 551, Guatemala. FIG. 35. Branch portion of *L. polycarpum*, Allen 2070. FIG. 36. Branch apex of *L. reflexum*, Scamman 7532.

Lycopodium eversum Poir. Encyc. Méth. Suppl. 3:556. 1813. TYPE: A renaming of *L. reflexum* Willd., and so based on the type of that name.

Lycopodium reversum K. Presl, Reliq. Haenk. 1:82. 1825. TYPE: Guayaquil, Pcia. Guayas, Ecuador, *Haenke* (PR not seen).

Lycopodium reflexum var. *densifolium* Baker, Handb. Fern-allies 11. 1887. SYNTYPES: Colombia, *Hartweg* 1480 (K not seen); Venezuela, *Moritz* 2266 (K not seen); and Brazil, *Glaziou* 15797 (K not seen).

TYPE: Martinique, *J. Martin* (P-Hb. Lam. 442 not seen), cited by Underwood and Lloyd (Bull. Torrey Bot. Club 33: 104. 1906).

Plants terrestrial, at 600–3300 m elevation, on wet banks or occasionally on rotting tree trunks, mostly in open areas, from the Cordillera Central, near Puriscal (Pcia. S. José), and the Cordillera de Talamanca to Pcia. Coclé. Also from the Antilles, Trinidad, Mexico to Bolivia, Brazil, and Paraguay.

This species is related to *L. hoffmannii* and may hybridize with it. Proctor (Rhodora 68:464. 1966) recognized *L. reflexum* var. *rigidum* (J. F. Gmel.) Proctor from Jamaica, Hispaniola, and several islands in the Lesser Antilles.

37. *Lycopodium saururus* Lam. Encyc. Méth. 3:653. 1789.

Lycopodium andinum Rosenst. Repert. Spec. Nov. Regni Veg. 5:239. 1908. TYPE: Murusata Mountains 40 km from La Paz, Depto. La Paz, Bolivia, *Buchtien* 173 (S not seen; isotype US).

TYPE: Bourbon [Réunion], *Commerson* (P not seen).

Plants terrestrial, at 2500–3400 m elevation, in páramos, from the Cordillera de Talamanca to Pcia. Chiriquí. Also from Venezuela, Colombia to Bolivia, and Argentina.

Rolleri (Revista Museo La Plata, Secc. Bot. 13:79. 1981) has ascribed *L. capellae* (Herter) Morton to Costa Rica on the basis of one specimen from Cerro Asunción, Pcia. S. José (*de la Sota* 5048, LP), which I have not seen. *Lycopodium capellae* differs from this species in having sporophylls shorter and wider than the sterile leaves and in having the leaves thinner and less appressed to the stems. Øllgaard (pers. comm.) is of the opinion that true *L. saururus* does not occur north of Peru. If so, this species may be without a correct name in the Flora area.

38. *Lycopodium subulatum* Desv. in Poir. Encyc. Méth. Suppl. 3:544. 1814.

Lycopodium congestifolium Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:70. 1842. TYPE: Peru, *Dombey* (LG not seen; isotypes G-Hb. Delessert, P neither seen).

Urostachys subulatus var. *polymorphus* Nessel, Bärlappgewächse 243. 1939, attributed erroneously to "(Willd.) Nessel." TYPE: Ecuador, *Humboldt* (B-Hb. Willd. 1943a not seen Tryon photo GH, US).

TYPE: Ecuador?, *Hb. Desvaux* (P not seen photo US).

Plants epiphytic, at (900)1800–2700 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Colombia to Argentina and Brazil.

39. *Lycopodium taxifolium* Swartz, Nov. Gen. Sp. Pl. Prodr. 138. 1788.

Lycopodium passerinoides H.B.K. Nov. Gen. Sp. 1:41 (fol. 33). 1816. TYPE: Near Olleras and Aipate, Depto. Puno, Peru, 747 hexap, *Humboldt* (B-Hb. Willd. 19410 not seen microfiche S. I. Library).

Lycopodium struthioloides K. Presl, Reliq. Haenk. 1:82. 1825. TYPE: "Hab. in Nootka-Sund," Vancouver Island, British Columbia, Canada. The specimen must be from tropical America, collected by *Haenke* (PRC not seen).

Lycopodium nitens Schlechtend. & Cham. Linnaea 5:623. 1830. PROBABLE TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede* 831 (B not seen fragm US).

Lycopodium herminieri Spring, Bull. Acad. Roy. Sci. Bruxelles 8:514. 1841. TYPE: Guadeloupe, *L'Herminier* (LG not seen).

Lycopodium picardae Christ ex Krug in Urban, Bot. Jahrb. Syst. 24:148. 1897. TYPE: Haiti, 1200 m, *Picarda* 978 (P? not seen fragm & photo US).

Lycopodium schwendeneri Herter, Bot. Jahrb. Syst. 43, Beibl. 98:50. 1909. TYPE: Haiti, 10 Sept 1908, *Bogemann* (B? not seen fragm US).

?*Urostachys panamensis* Nessel, Bärlappgewächse 189. 1939, attributed to "(Humb. & Bonpl.) Herter." TYPE: Based on Panama, *Bonpland* (B-Hb. Willd. 19411 not seen Tryon photo US). This is a new species because the name *L. panamense* Willd. is unpublished, but it is also superfluous because *L. brongniartii* Spring is cited in synonymy.

Urostachys costaricensis Herter, Amer. Fern J. 48:83. 1958. TYPE: Costa Rica, Mar 1908, *Ridgway* (US).

TYPE: Jamaica, *Swartz* (S not seen).

Plants epiphytic, at 1000–2200(2900) m elevation, in forests, from the Cordillera Central to Pcia. Chiriquí. Also from the Antilles and Trinidad to Surinam and from Mexico to Venezuela and Peru.

The dimorphism varies in this species from slight (usually in young and short plants) to extreme (usually in old and long plants).

40. *Lycopodium tortile* Christ, Bull. Soc. Bot. Genève II, 1:235. 1909.

Lycopodium comans Christ in Schwacke, Pl. Nov. Mineir. 2:40. 1900, non Hook., 1844. SYNTYPES: Serra de Itatiaia, Est. Rio de Janeiro, Brazil, 2300 m, *Ule* 255 and 3537 (P or B neither seen).

Urostachys comans Herter, Bärlappgewächse 127. 1939, attributed erroneously to "(Christ) Hert." TYPE: In effect a renaming of *L. comans* Christ in Schwacke, and so based on the type of that name.

TYPE: Navarro, Pcia. Cartago, *Wercklé* in 1905 (B-Hb. Christ not seen; isotype US).

Plants epiphytic, at 1000–2900 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Colombia, Ecuador, and Brazil.

This species differs only slightly from *L. tuerckheimii* Maxon (Contr. U. S. Natl. Herb. 13:23. 1909). The only difference I have seen is that the sporophylls of *L. tortile* are often much shorter than the sterile leaves, a condition much less marked in *L. tuerckheimii*. If the two are united, *L. tortile* has priority by a few days.

41. *Lycopodium tubulosum* Maxon, Contr. U. S. Natl. Herb. 17:178, t. 10. 1913.

TYPE: Pacayas, at the foot of Volcán Turrialba, Pcia. Cartago, 1400 m, *Biolley fil.* 17398 (US fragm NY).

Plants epiphytic, at 600–2000 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí.

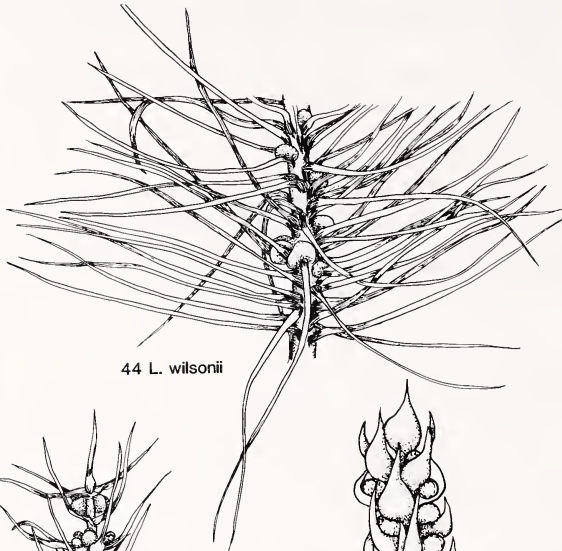
42. *Lycopodium verticillatum* var. *parvifolium* (Wercklé ex Nessel) Lellinger, Proc. Biol. Soc. Wash. 89:719. 1977.

Urostachys verticillatus var. *parvifolius* Wercklé ex Nessel, Revista Sudamer. Bot. 6:163, f. 43. 1940. TYPE: Volcán Barba, Pcia. Heredia, 2100 m, *Brade & Brade* 283 (HB not seen).

Plants epiphytic, at 1100–2400 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico to Nicaragua.



37 *L. saururus*



44 *L. wilsonii*



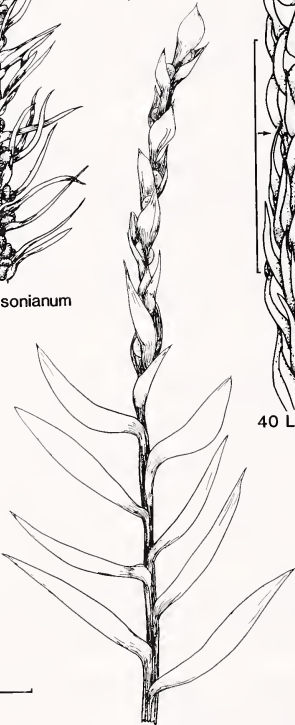
43 *L. watsonianum*



42 *L. verticillatum*
var. *parvifolium*



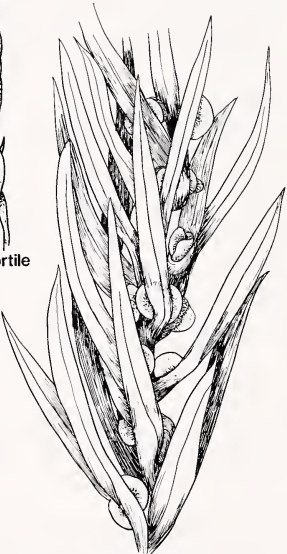
41 *L. tubulosum*



38 *L. subulatum*



40 *L. tortile*



39 *L. taxifolium*

This variety is slightly distinct from typical material from Réunion in its shorter, more spreading sterile leaves. It differs from *L. tortile* in having thinner, laxer, less appressed sterile leaves, particularly at the base of the stems. Øllgaard in Stolze (Fieldiana, Bot. N.S., 12:32. 1983) considers this to be a species distinct from the Old World *L. verticillatum* and calls it *L. acerosum* Swartz. Specimens from Sitio Birris, Pcia. Cartago [?] (Pittier 191, US) and Volcán Chiriquí (Davidson 1021, US) look much like *L. verticillatum* var. *parvifolium* but may prove to be a variety of *L. tenue* Willd., according to B. Øllgaard (in litt.).

43. *Lycopodium watsonianum* Maxon, Smithsonian Misc. Collect. 56(29):3, t. 3. 1912.

TYPE: Upper Caldera river, Holcomb's Trail above Boquete, Pcia. Chiriquí, ca. 1600 m, *Maxon 5712* (US fragm NY).

Plants epiphytic, at 900–2700 m elevation, in forests, from Los Angeles de S. Ramón (Pcia. Alajuela), the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí.

This species has pendent stems up to 10-times branched. The sterile leaves are more spreading than are those of *L. verticillatum* var. *parvifolium*, which are clearly ascending.

44. *Lycopodium wilsonii* Underw. & Lloyd, Bull. Torrey Bot. Club 33:111. 1906.

Lycopodium trichodendron Herter, Bot. Jahrb. Syst. 43, Beibl. 98:35, 49. 1909. TYPE: Guadeloupe, *Bory 103* (P not seen).

Lycopodium stamineum Maxon, Smithsonian Misc. Collect. 56(29):2, t. 2. 1912. TYPE: Upper Río Caldera watershed, Holcomb's Trail above Boquete, Pcia. Chiriquí, ca. 1750 m, *Maxon 5636* (US).

Lycopodium arcanum Maxon ex Yuncker, Field Mus. Nat. Hist., Bot. Ser. 17:310, t. 3. 1938. TYPE: Above El Achote, Depto. Comayagua, Honduras, 1800 m, *Yuncker, Dawson & Youse 6149* (US).

TYPE: Luquillo Mountains, Puerto Rico, *Wilson 271* (NY not seen).

Plants epiphytic, at 1700–2700 m elevation, from the Cordillera Central, Palmira (Pcia. Heredia), the Fila de Cedral, Cerro Carpintera, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Jamaica, Puerto Rico, Guadeloupe, Martinique, and Mexico to Venezuela and Ecuador.

Øllgaard in Stolze (Fieldiana, Bot. N. S., 12:43–44. 1983) has united *L. stamineum* with *L. wilsonii*. The plants of the former species tend to have narrower leaves with reddish bases, but the coloration may be inconstant and specimens of the latter with narrow leaves matching those of *L. stamineum* are known.

FIGS. 37–44. *Lycopodium*. FIG. 37. Branch portion of *L. saururus*, Williams 20052. FIG. 38. Branch portion of *L. subulatum*, Tonduz 1958. FIG. 39. Branch portion of *L. taxifolium*, Allen 1568. FIG. 40. Branch apex of *L. tortile*, Standley 35410. FIG. 41. Branch portion of *L. tubulosum*, Skutch 2389. FIG. 42. Branch portion of *L. verticillatum* var. *parvifolium*, Terry 1021. FIG. 43. Branch portion of *L. watsonianum*, Woodson & Schery 690. FIG. 44. Branch portion of *L. wilsonii*, Standley & Valerio 49898.

SELAGINELLACEAE

Monotypic; see description of *Selaginella*.

3. SELAGINELLA Pal. Beauv.

Plants terrestrial, occasionally epipetric, rarely hemiepiphytic or epiphytic; stems mostly prostrate and long-creeping, ascending, or erect, rarely caespitose, branched, ca. 0.5–3 mm in diam., often articulate, usually stramineous or greenish, often sulcate, bearing often long, wiry, dichotomously branched roots from the axils of the branches and bearing numerous, small, 1-nerved, usually ovate or lanceolate, often aristate and ciliate or denticulate leaves, the leaves monomorphic, crowded, and spirally arranged around the stems or dimorphic, usually not crowded, and arranged in 2 small, dorsal, appressed ranks and 2 ventral, larger, usually spreading ranks; sporophylls usually monomorphic, slightly modified, aggregated into usually rather loose terminal strobili; sporangia solitary in the axils of the sporophylls, the megasporangia bearing 1–4 large, pale, trilete megaspores, the distal microsporangia bearing many, much smaller, often orange, trilete microspores.

Pantropical with some temperate and xerophytic species; ca. 700 species. *Selaginella* is usually divided into subg. *Selaginella*, with uniform, spirally arranged leaves, and subg. *Stachygynandrum* (Pal. Beauv.) Baker, with dimorphic leaves arranged in 4 ranks. (Only the latter is represented in the Flora area.) Hellwig (1969) found that spore characters support the subgeneric classification and point toward a classification below that level. However, additional characters, such as habit and stelar structure, need to be taken into account. Some species of *Selaginella* are attractive plants in tropical gardens and in greenhouses, especially *S. pallescens*, with white-margined leaves, *S. umbrosa*, with red stems, and *S. exaltata*, a large, scrambling species with ample, feathery branches.

ALSTON, A. H. G. 1955. The heterophyllous Selaginellae of continental North America. Bull. Brit. Mus. (Nat. Hist.), Bot. 1:221–274, t. 5, 6.

———, A. C. JERMY and J. M. RANKIN. 1981. The genus *Selaginella* in tropical South America. Bull. Brit. Mus. (Nat. Hist.), Bot. 9:233–330.

HELLWIG, R. L. 1969. Spores of the heterophyllous Selaginellae of Mexico and Central America. Ann. Missouri Bot. Gard. 56:444–464.

1. Stems not articulate; aerial roots emanating from the abaxial side (with lateral leaves) of the stems..17.

1. Stems articulate; aerial roots emanating from the adaxial side (with median leaves) of the stems. Megaspores often solitary in the basal sporophylls of the strobili; microspores beige..2.

2(1). Branches glabrous..5.

2(1). Branches pubescent..3.

3(2). Plants scandent, 1–2 m long; lateral leaves of the ultimate branches up to 2.5 mm long. Branches of the main stems pinnate.

55. *S. exaltata*

3(2). Plants suberect, less than 1 m long; lateral leaves of the ultimate branches 3–7 mm long..4.

4(3). Branches of the main stems dichotomous; lateral leaves entire, with a small, curved auricle at the acroscopic base.

47. *S. articulata*

4(3). Branches of the main stems pinnate; lateral leaves distantly denticulate, not auriculate at the acroscopic base.

83. *S. tomentosa*

5(2). Main stems branched from near the base, prostrate to erect; leaves dimorphic and the lateral ones spreading throughout..7.

5(2). Main stems simple, erect, the plants arborescent; leaves subequal and uniformly decreasing in size towards the base of the plant..6.

6(5). Basiscopic base of lateral leaves truncate. Plants usually ca. 30 cm long; all leaves entire or the lateral ones slightly denticulate toward the base; median leaves acute, with 1 large auricle.

46. *S. arthritica*

6(5). Basiscopic base of lateral leaves cordate-auriculate. Plants 30–60 cm long; leaves all entire or the lateral ones slightly denticulate toward the base; median leaves acute, with 2 unequal auricles.

58. *S. geniculata*

7(5). Lateral leaves ca. 3–4 mm long..9.

7(5). Lateral leaves up to 2(3) mm long..8.

8(7). Leaves white-margined, the lateral ones long-ciliate at the base. Plants prostrate in dense mats, the branches ascending at the tips; leaves ovate-lanceolate, ca. 2 times longer than wide, acute at the apex, ciliate on the unequal auricles.

48. *S. atirrensis*

8(7). Leaves not white-margined, the lateral ones entire at the base. Plants prostrate in dense mats, the branches ascending at the tips; lateral leaves 1.5–2 times longer than wide, acute or somewhat round at the apex; median leaves ca. 3 times longer than wide, very unequally biauriculate.

46. *S. arthritica*

9(7). Median leaves with 1 auricle or with 2 unequal auricles, one twice as large as the other..12.

9(7). Median leaves with 2 subequal auricles..10.

10(9). Median leaves acuminate, their auricles large, $1/4$ – $1/6$ as long as the leaf; lateral leaves ovate-oblong; plants erect, their stems rooting in the proximal $1/3$. Plants usually less than 30 cm long; stems $1(2)$ mm in diam. at the base.

57. *S. galeottii*

10(9). Median leaves aristate, their auricles very short; lateral leaves oblong; plants scandent, their stems rooting in the proximal $2/3$..11.

11(10). Stems distinctly articulate, trailing; stolons absent. Plants usually 30–50 cm long; stems 2–3 mm in diam. at the base.

80. *S. silvestris*

11(10). Stems obscurely articulate, erect; stolons usually present. Plants ca. 35 cm long; stems 0.75–2 mm in diam. at the base, bearing thin, elongate, trailing soboliferous stems producing an elongate tuber at their apex.

84. *S. tuberosa*

12(9). Median leaves biauriculate..14.

12(9). Median leaves uniauriculate..13.

13(12). Main stems commonly flagelliform at the apex; lateral leaves of the main stems ascending. Axillary leaves biauriculate, the small auricles short-ciliate; median leaves subaristate, evenly denticulate throughout, not white-margined.

79. *S. sertata*

13(12). Main stems never flagelliform; lateral leaves of the main stems spreading, parallel-sided. Axillary leaves biauriculate, the auricles equal, entire or sparsely ciliate; median leaves sparsely ciliate proximally, denticulate distally, not white-margined.

54. *S. eurynota*

14(12). Lateral leaves of the main stems ca. 1 mm wide, ca. 8 mm distant, the stems 8–14 mm wide including the leaves. Axillary leaves exauriculate, denticulate, slightly white-margined; median leaves acuminate, unevenly biauriculate, entire or denticulate, slightly white-margined.

64. *S. kunzeana*

14(12). Lateral leaves of the main stems mostly more than 1.5 mm wide, no more than 5(8) mm distant, the stems 6–8 mm wide including the leaves..15.

15(14). Lateral leaves nearly symmetrical, almost exauriculate, entire or sparingly denticulate at the base. Median leaves aristate, very unequally biauriculate.

80. *S. silvestris*

15(14). Lateral leaves asymmetrical, with a curving, acroscopic auricle, copiously ciliate at the base..16.

16(15). Lateral leaves of the ultimate branches ovate-lanceolate like those of the main stems; median leaves acuminate, often ciliate. Leaves coriaceous, ciliate at the base, entire distally; midrib of the median leaves prominent.

52. *S. diffusa*

16(15). Lateral leaves of the ultimate branches parallel-sided, unlike those of the main stems; median leaves aristate, entire or denticulate. Plants in prostrate mats, with the fertile branches erect.

61. *S. horizontalis*

17(1). Stems forming rosettes, curling inwards when dry; leaves usually subcoriaceous. Leaves white-margined, ciliate, dark green adaxially, the leaves of the main stem pale brown abaxially.

73. *S. pallescens*

17(1). Stems not forming rosettes; leaves usually membranaceous..18.

18(17). Stems erect, ascending, or prostrate, not reddish..21.

18(17). Stems erect and reddish, at least at the base..19.

19(18). Leaves of the main stems proximal to the branched portion dimorphic and the lateral ones spreading, except at the base of the stem; stems pale reddish. Leaves narrowly white-margined, faintly denticulate, the median ones aristate, the lateral ones subacute, oblong.

60. *S. hoffmannii*

19(18). Leaves of the main stems proximal to the branched portion monomorphic, ascending and appressed to the stem; stems bright red..20.

20(19). Lateral leaves ciliate only at and near the base, the acroscopic margin entire. Plants usually less than 30 cm long, the frond-like portion deltate, not exceeding 15(20) cm long, 15 cm wide.

85. *S. umbrosa*

20(19). Lateral leaves not ciliate at the base, the acroscopic margin usually minutely and evenly denticulate. Plants 20–60 cm long, the frond-like portion broadly lanceate, 15–40 cm long, 15–30 cm wide.

59. *S. haematodes*

21(18). Leaves on main stems proximal to the branched portion dimorphic, sometimes smaller at the base of the main stem; most species not arborescent..30.

21(18). Leaves on main stems proximal to the branched portion monomorphic; most species arborescent..22.

22(21). Branches (including the leaves) up to 10(11) mm wide; strobili always terminal on leafy branches..24.

22(21). Branches (including the leaves) 13–15 mm wide; strobili mostly appearing lateral on a leafy branch..23.

23(22). Median leaves shortly aristate, denticulate proximal to the apex.

49. *S. bombycina*

23(22). Median leaves acuminate, entire proximal to the apex.

81. *S. tanyclada*

24(23). Basiscopic margin of the lateral leaves round at the base; plants terrestrial, up to 30(35) cm long (75 cm in *S. wolfii*) or hemiepiphytic, up to 2 m long..27.

24(23). Basiscopic margin of the lateral leaves truncate at the base; plants terrestrial, (15)30–75 cm long..25.

25(24). Plants forming scrambling vines. Median leaves evenly biauriculate, acute; lateral leaves biauriculate, ascending, acute to round at the apex; all leaves entire, lacking cilia.

74. *S. plana*

25(24). Plants arborescent, not scrambling..26.

26(25). Leaves of the main stem ca. 3 mm long, appressed to the stem up to the third to sixth branch; lateral leaves strongly ciliate.

45. *S. anceps*

26(25). Leaves of the main stems 5–6 mm long, usually spreading above the first or second branch; lateral leaves denticulate.

72. *S. oaxacana*

27(23). Plants hemiepiphytic, up to 2 m long, the main stems at maturity adherent to tree trunks.

65. *S. longissima*

27(23). Plants terrestrial, up to 75 cm long..28.

28(27). Branches (including the leaves) 7–12 mm wide; leaves entire, those of the main upright stems the largest.

87. *S. wolfii*

28(27). Branches (including the leaves) 2–3 mm wide; leaves denticulate to ciliate, those of the main upright stems not larger than those of the branches..29.

29(28). Lateral leaves of the main stem ovate, more or less appressed, imbricate, sparingly ciliate at the base.

73. *S. pallescens*

29(28). Lateral leaves of the distal half of the main stem oblong and 2 times longer than wide, spreading, not imbricate, densely ciliate on the acroscopic base.

86. *S. viticulosa*

30(21). Lateral leaves with a false vein on either side of the midrib. Lateral leaves distant, broadly ovate-lanceolate, acute at the apex, the adaxial surface usually pubescent towards the leaf base; branches sometimes flagelliform and terminated by a bud.

75. *S. porphyrospora*

30(21). Lateral leaves without false veins..31.

31(30). Main stems (including the leaves) no more than 7(8) mm wide..34.

31(30). Main stems (including the leaves) ca. 10 mm wide..32.

32(31). Median leaves long-ciliate; lateral leaves long-ciliate at the base, denticulate toward the apex, subacute, round at the acroscopic base, truncate or cordate at the basiscopic base.

53. *S. estrellensis*

32(31). Median leaves denticulate; lateral leaves denticulate at the base, entire toward the apex, obtuse, round at the acroscopic and basiscopic base..33.

33(32). Median leaves aristate; strobili terminal on a leafy branch.

67. *S. martensii*

33(32). Median leaves acute-acuminate; strobili appearing lateral on a leafy branch.

50. *S. chrysoleuca*

34(31). Stems suberect; aerial roots confined to the proximal half of the stem..41.

34(31). Stems prostrate or nearly so, rooting throughout..35.

35(34). Branches (including the leaves) mostly ca. 2 mm wide; plants less than 10 cm long. Lateral leaves broadly ovate-lanceolate; median leaves elliptic-acuminate.

68. *S. microphylla*

35(34). Branches (including the leaves) more than 3 mm across; plants 10–25 cm long..36.

36(35). Lateral leaves long-ciliate at the acroscopic base; aerial roots ca. 0.25 mm in diam., flexible; main stems ca. 0.5 mm in diam..39.

36(35). Lateral leaves denticulate at the acroscopic base..37.

37(36). Lateral leaves less than 2 mm long; plants 10–15 cm long. Aerial roots ca. 0.25 mm in diam., flexible; main stems ca. 0.5 mm in diam.

54a. *S. euclimax*

37(36). Lateral leaves 2.5–4 mm long; plants mostly at least 15 cm long. Aerial roots ca. 0.5 mm in diam., stiff; main stems ca. 0.75 mm in diam..38.

38(37). Lateral leaves ca. 1 mm wide, white-margined at the acroscopic base. Lateral leaves ovate-lanceolate; median leaves elliptic-aristate, denticulate throughout.

82. *S. tarapotensis*

38(37). Lateral leaves ca. 1.5–2 mm wide, not white-margined at the acroscopic base. Lateral leaves asymmetrically ovate; median leaves elliptic-aristate, denticulate only toward the base.

76. *S. producta*

39(36). Median leaves denticulate toward the apex; leaves membranaceous, curling laterally when dry. Lateral leaves ovate-lanceolate, round at the apex, sometimes sparsely pubescent adaxially; median leaves broadly elliptic-aristate.

77. *S. revoluta*

39(36). Median leaves regularly ciliate toward the apex; leaves not curling when dry..40.

40(39). Median leaves elliptic-aristate; lateral leaves white-margined abaxially, the cilia at the leaf base ca. 1/4–1/3 as wide as the leaf; lateral leaves distant on the main stems.

62. *S. huehuetenangensis*

40(39). Median leaves orbicular-aristate; lateral leaves not white-margined abaxially, the cilia at the leaf base ca. 1/2 as wide as the leaf; lateral leaves approximate on the main stems.

63. *S. idiospora*

41(34). Lateral leaves acute and usually slightly acuminate at the apex..44.

41(34). Lateral leaves nearly obtuse to round and not acuminate at the apex..42

42(41). Stems ca. 1 mm in diam.; median leaves ovate-acuminate, denticulate.

78. *S. seemannii*

42(41). Stems 0.5–0.75 mm in diam.; median leaves elliptic-aristate..43.

43(42). Lateral leaves elliptic, denticulate to entire; sporophylls monomorphic. Median leaves elliptic-aristate, less than half as wide as the lateral leaves, denticulate; main stems sometimes flagelliform.

51. *S. cladorrhizans*

43(42). Lateral leaves obliquely oblong, ciliate to denticulate; sporophylls dimorphic. Median leaves elliptic-aristate, more than half as wide as the lateral leaves, denticulate.

66. *S. lychnuchus*

44(41). Lateral leaves entire or ciliate-denticulate. Main stems flagelliform and rooting at the apex; lateral leaves ovate, acuminate; median leaves lanceolate-aristate, weakly uniauriculate.

56. *S. flagellata*

44(41). Lateral leaves ciliate (rarely denticulate in *S. novae-hollandiae*)..45.

45(44). Plants less than 5 cm long; stems lacking reduced, vegetatively reproductive stolons at the base. Lateral leaves ovate, acute, long-ciliate at the base; median leaves lanceolate.

69. *S. minima*

45(44). Plants at least (5)7 cm long; stems often with reduced, vegetatively reproductive stolons at the base..46.

46(45). Median leaves long-aristate, exauriculate; lateral leaves obliquely oblong, strongly ciliate at the base.

70. *S. mollis*

46(45). Median leaves acuminate to weakly aristate, very unevenly biauriculate; lateral leaves broadly ovate, weakly ciliate almost to the apex.

71. *S. novae-hollandiae*

45. *Selaginella anceps* (K. Presl) K. Presl, Abh. Königl. Böhm. Ges. Wiss. V, 3:581 (repr. 151). 1845.

Lycopodium gracile Desv. ex Poir. Encyc. Méth. Suppl. 3:551. 1814. TYPE LOCALITY: Peru.

Lycopodium anceps K. Presl, Reliq. Haenk. 1:80. 1825. TYPE: "Hab. in insula Luzon" [actually Peru], Haenke (PRC not seen).

Selaginella gracilis (Desv. ex Poir.) Hieron. Hedwigia 58:292. 1917, non Moore, 1886, nom. illeg.

Plants terrestrial, at 0–1000(1700) m elevation, in or at the edges of forests, often covering large areas, from throughout the Flora area. Also from Venezuela to Bolivia.

46. *Selaginella arthritica* Alston, Arch. Bot. Sist. 11:43. 1935.

TYPE: Golfo Dulce, near Puerto Jiménez, Pcia. Puntarenas, 30 m, *Cufodontis* 218 (BM not seen fragm US: isotype W not seen).

Plants terrestrial, at 0–900(1200) m elevation, in forests, throughout Costa Rica and Panama and from the Río Nuquí, Depto. Chocó (*Haught* 5460, BM, US). Also from Nicaragua and Colombia.

This species has both a prostrate, juvenile, usually sterile phase with upright branches up to ca. 8 cm long and an arborescent, mature, fertile phase with upright branches over 30 cm long. Although the two phases are completely unlike in habit, the leaves of both are similar in their details. Occasionally the lateral branches of *S. arthritica* become abnormally long and bifurcate, bud, or root at the apex.

47. *Selaginella articulata* (Kunze) Spring, Flora 21:182. 1838.

Lycopodium articulatum Kunze, Linnaea 9:10. 1834. TYPE: Tocache Mission, at the Río Huallaga, Depto. Loreto, Peru, Jul–Aug 1830, *Poeppig* (LZ destroyed).

Plants terrestrial, at 500–1000 m elevation, in forests, from around El Valle, Sta. Rita ridge (Pcia. Colón), and Campo Tres (Pcia. Panama). Also from Venezuela to Bolivia.

48. *Selaginella atirrensensis* Hieron. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):711. 1901.

LECTOTYPE: Atirro, Pcia. Cartago, 2000 ft, *J. D. Smith* 5103 (US; isoelectotype NY), chosen by Alston (Bull. Brit. Mus. (Nat. Hist.), Bot. 1:259. 1955).

Plants terrestrial, at 0–2400 m elevation, in forests, from scattered localities in the Cordillera Central and the Atlantic coastal plain through the Chocó. Also from Venezuela to Peru.

This species exists in a low-altitude (up to ca. 600 m), rather erect growth form and in a high-altitude, creeping form. The leaves in both forms are variable, especially in marginal cilia length and in the width of the whitish, marginal band around the leaves. Neither of these characters correlates with habit. Bruce McAlpin (pers. comm.) found that the two forms maintained themselves under conditions of uniform culture. Although it is possible that two species are involved, I have not been able to separate the specimens by any character other than habit.

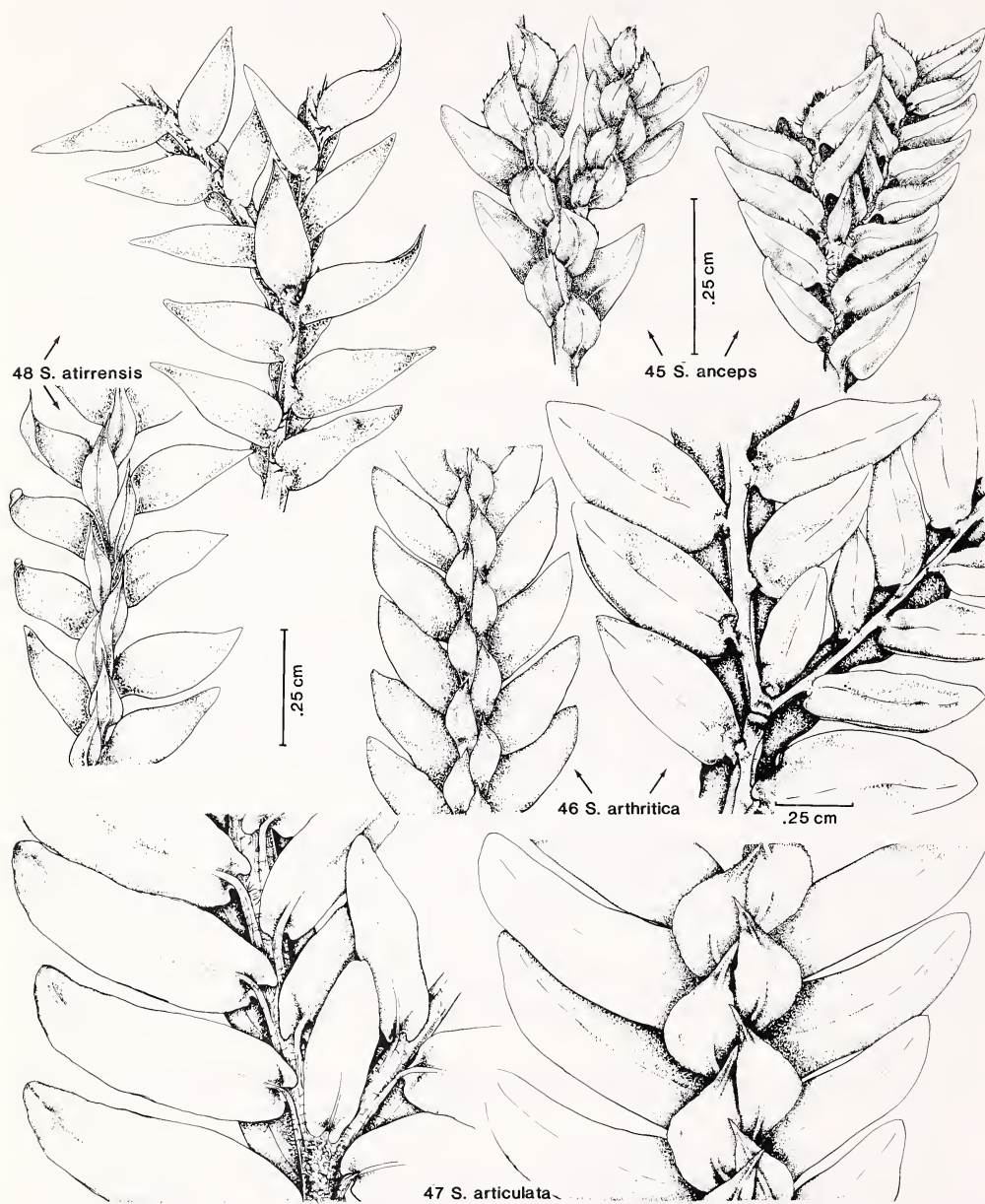
49. *Selaginella bombycina* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:191. 1849.

TYPE: Peru, *Mathews* (K not seen).

Plants terrestrial, at 300–800 m elevation, mostly in wet forests, from the Atlantic side of the Cordillera Central, western Panama, and scattered localities in the Chocó. Also from Colombia to Peru.

50. *Selaginella chrysoleuca* Spring, Bull. Acad. Roy. Sci. Bruxelles 10:226. 1843.

Selaginella sprucei Hook. Sec. Cent. Ferns t. 83. 1861. TYPE: Mt. Campana, near Tarapoto, Depto. S. Martín, Peru, *Spruce* 4623 (K not seen; isotypes BM, CGE neither seen, US).



Selaginella centipediformis Gómez, Phytologia 52:153. 1982. TYPE: Fortuna hydroelectric project, Pcia. Chiriquí, 1200–1400 m, *Hammel 2121* (MO).

TYPE: Bolivia, *D'Orbigny* (P not seen).

Plants terrestrial, at 1100–1400 m elevation, in the Flora area known only from the Fortuna hydroelectric project area. Also from Venezuela to Bolivia.

This species, like *S. bombycina*, is unusual in bearing the strobili apparently laterally, rather than at the apex of leafy branches.

51. *Selaginella cladorrhizans* A. Braun, Ann. Sci. Nat. Bot. V, 3:282. 1865.

Selaginella ambigua A. Braun, Ann. Sci. Nat. Bot. V, 3:286. 1865. TYPE: Quebrada del Imposible, Cumaná, Edo. Sucre, Venezuela, *Moritz 221* (B not seen; isotype BM not seen Morton photo 6522).

SYNTYPES: Colonia Tovar, Edo. Aragua, Venezuela, *Moritz 448* (B not seen); and *Fendler 324 p. p.* (B not seen; isosyntype NY).

Plants terrestrial, at 100–800 m elevation, in swamps and forests, from along the Alajuela–Grecia Highway and the cliffs of the R. Rosales (Pcia. Alajuela) and scattered localities throughout Panama. Also from Mexico to Honduras, Nicaragua, Trinidad, Tobago, and Venezuela.

The median leaves of this species are unusually small in proportion to the lateral leaves.

52. *Selaginella diffusa* (K. Presl) Spring, Bull. Acad. Roy. Sci. Bruxelles 10:143. 1843.

Lycopodium diffusum K. Presl, Reliq. Haenk. 1:78. 1825. TYPE: Panama, *Haenke* (PRC 24294 not seen photo at F).

Lycopodium mnioides Sieber ex Hook. & Grev. Bot. Misc. 2:394. 1831. TYPE: Trinidad, *Sieber Fl. Mixt.* 325 (K? not seen).

Selaginella ciliauricula Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:219. 1849. SYNTYPES: Mérida, Edo. Mérida, Venezuela, *Moritz 380* (B not seen; isosyntype LG not seen); and Chivada de Sta. Marta, Depto. Magdalena, Colombia, *Purdie* (K not seen), synonymized by Alston (J. Bot. Brit. For. 72:36. 1934).

?*Selaginella cirrhipes* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:221. 1849. TYPE: Galipán, Distr. Fed., Venezuela, *Moritz 379* (LG not seen).

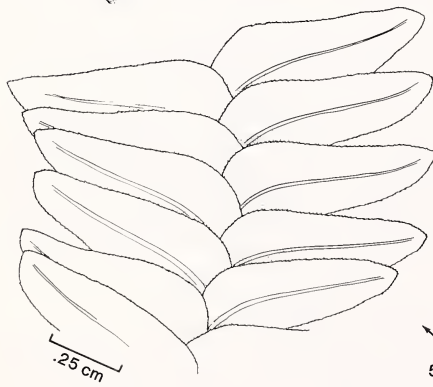
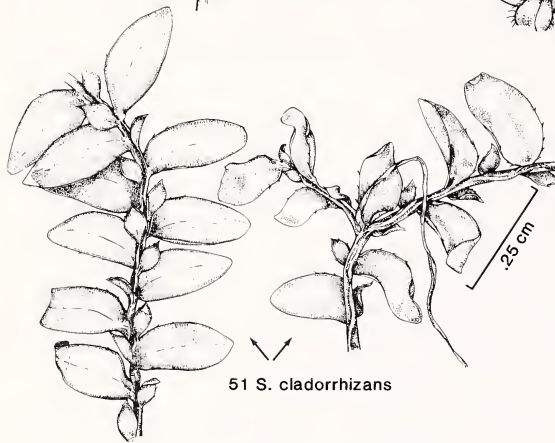
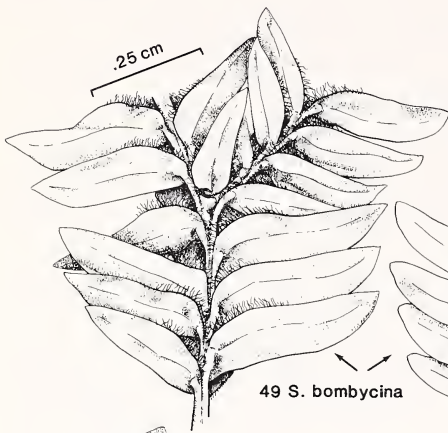
Selaginella polycephala Baker, J. Bot. Brit. For. 21:332. 1883. SYNTYPES: Mountains of Ocaña, Depto. Norte de Santander, Colombia, 5000–6000 ft, *Schlim 493* (K not seen fragm NY) and Colombia, *Holton 82* (K not seen).

Plants terrestrial, at (200)800–1700 m elevation, in forests and pastures on wet banks and tree bases, from the Cordillera Central, the northern foothills of the Cordillera de Talamanca, the Peninsula de Osa, El Valle, north of Gamboa (Canal Zone), and the Serranía de Baudó (Depto. Chocó). Also from Trinidad and Venezuela to Ecuador.

53. *Selaginella estrellensis* Hieron. Hedwigia 41:200. 1902.

LECTOTYPE: Estrella, Pcia. Cartago, 4400 ft, *Cooper 6062* (US; isolectotype B not seen), chosen by Alston (Bull. Brit. Mus. (Nat. Hist.), Bot. 1:249. 1955).

FIGS. 45–48. *Selaginella*. FIG. 45. Branch portions of *S. anceps*, Lewis 2067. FIG. 46. Branch portions of *S. arthritica*, Standley 45278. FIG. 47. Branch portions of *S. articulata*, Hunter & Allen 308. FIG. 48. Branch portions of *S. atirrensis*, Stork 4629.



Plants terrestrial, at 1200–2400(3200) m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Honduras to Nicaragua.

53a. *Selaginella euclimax* Alston ex Crabbe & Jermy, Fern Gaz. 11:259. 1976.

TYPE: West of Tambo, Depto. Cauca, Colombia, 2300 m, *Haught 5220* (BM not seen; isotypes COL not seen, US).

Plants terrestrial, at 1200 m elevation, in forests, in the Flora area known only from the trail west of the continental divide on the road from Fortuna Lake to Chiriquí Grande, Pcia. Chiriquí (*Hampshire & Whiteford 8456*, BM, CR neither seen, US). Also from Colombia.

54. *Selaginella eurynota* A. Braun, Ann. Sci. Nat. Bot. V, 3:293. 1865.

TYPE: Near Aguacate, Pcia. S. José, *Hoffmann 907* (B not seen; isotype K not seen).

Plants terrestrial, at 0–1000 m elevation, in wet and moist forests, from the Cordillera de Tilarán to the Canal Zone, and also in the central Chocó. Also from Guatemala and Nicaragua.

55. *Selaginella exaltata* (Kunze) Spring, Bull. Acad. Roy. Sci. Bruxelles 10:234. 1843.

Lycopodium exaltatum Kunze, Linnaea 9:8. 1834. TYPE: From Uchiza to Tocache, Depto. Loreto, Peru, *Poeppig 1953* (LZ destroyed; isotype LG not seen).

Selaginella strobilifera Christ, Bull. Herb. Boissier II, 1:72. 1901. TYPE: Between Ucayali and Huallaga, Depto. Loreto, Peru, *Huber 1515* (P not seen).

Plants terrestrial, at 0–200(400) m elevation, in wet forests, from the Peninsula de Osa (Pcia. Puntarenas) and the lowlands of Panama and the Chocó. Also from other areas in Colombia and from Ecuador to Bolivia.

This species is always erect when fertile, but may be prostrate when sterile.

56. *Selaginella flagellata* Spring, Bull. Acad. Roy. Sci. Bruxelles 10:228. 1843.

Selaginella rhizophora Baker, J. Bot. Brit. For. 22:244. 1884. SYNTYPES: Near the towns of S. Juan and Panama, Pcia. Panama, *Seemann 29* and *32* (both K neither seen frags NY).

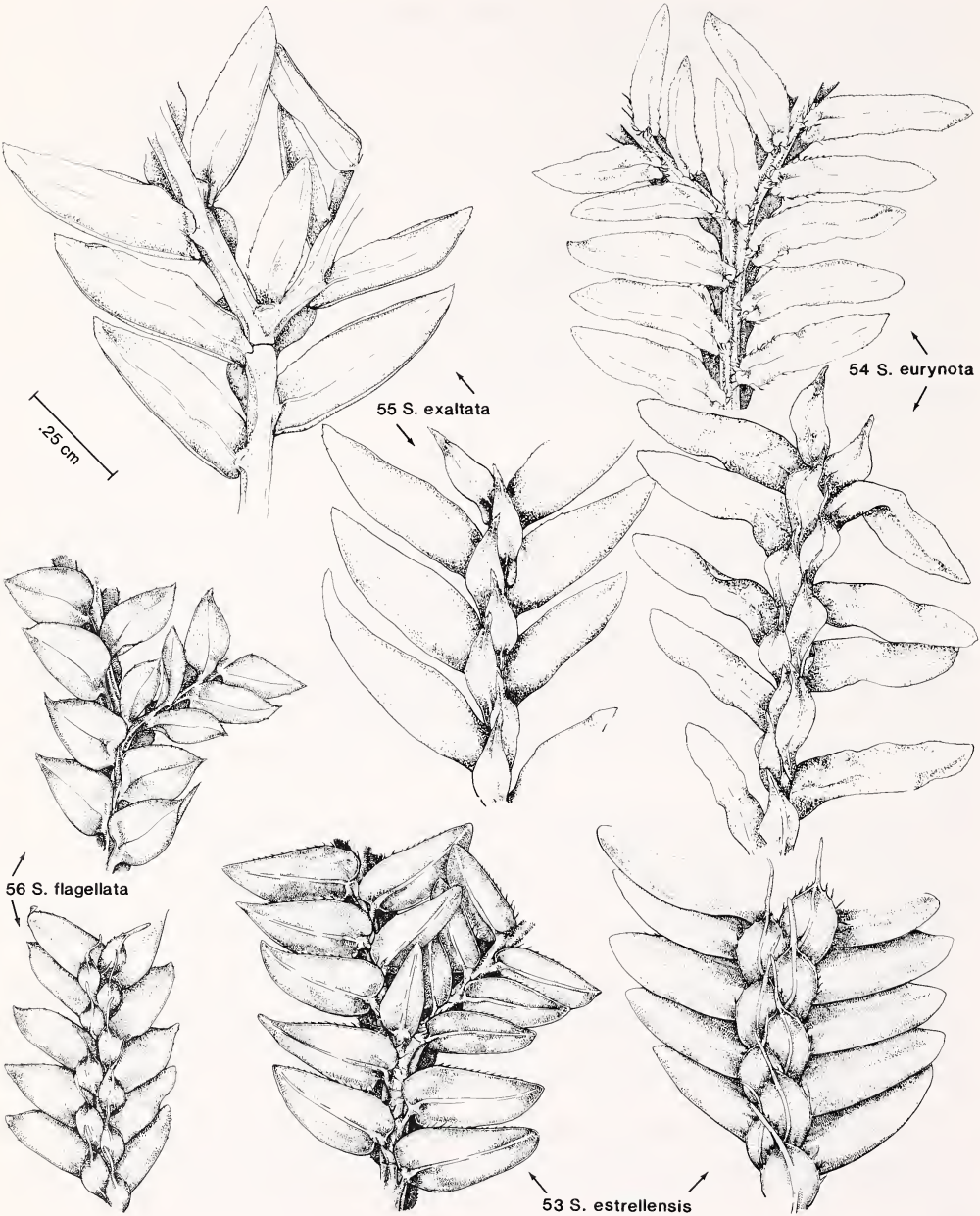
TYPE: Upper Oyapok River, French Guiana, *Leprieur* (LG not seen; isotypes B, G, P none seen).

Plants terrestrial or epipetric, at 0–300(600) m elevation, in forests and stream beds, from the Atlantic and Pacific lowlands of Costa Rica to the Canal Zone and Pcia. Panama. Also from Mexico, Guatemala, Nicaragua, Trinidad and Tobago, and Venezuela to Bolivia, Brazil, and the Guianas.

57. *Selaginella galeottii* Spring, Bull. Acad. Roy. Sci. Bruxelles 10:230. 1843.

? *Selaginella poeppigiana* var. *mexicana* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:218. 1849. TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede* (B not seen; possible isotype BM not seen).

FIGS. 49–52. *Selaginella*. FIG. 49. Branch portions of *S. bombycina*, Hart 61. FIG. 50. Branch portions of *S. chrysouleuca*, Hammel 2121. FIG. 51. Branch portions of *S. cladorrhizans*, Standley 31032. FIG. 52. Branch portions of *S. diffusa*, Maxon 7935.



LECTOTYPE: Edo. Veracruz, Mexico, *Galeotti* 6606 (P not seen photo BM not seen; isolectotype LG not seen), chosen by Alston (Bull. Brit. Mus. (Nat. Hist.), Bot. 1:259. 1955).

Plants terrestrial, at (600)1000–1700 m elevation, in forests, from north of S. Ramón, the Cordillera Central, the northern foothills of the Cordillera de Talamanca, the Fortuna dam site (Pcia. Chiriquí), and the Río dos Bocas valley northwest of Sta Fé. Also from Mexico, Guatemala, Belize, and Honduras.

58. *Selaginella geniculata* (K. Presl) Spring, Bull. Acad. Roy. Sci. Bruxelles 10:230. 1843.

Lycopodium geniculatum K. Presl, Reliq. Haenk. 1:80. 1825. TYPE: “In insula Luzon” [probably Guayaquil, Ecuador or Depto. Huánuco, Peru], *Haenke* (PRC not seen).

Selaginella ferruminata Spring, Bull. Acad. Roy. Sci. Bruxelles 10:231. 1843. TYPE: Pangoa, Depto. Junín, Peru, *Mathews* 1083 (P not seen; isotypes FI not seen, K not seen, US).

Selaginella elongata Klotzsch, Linnaea 18:522. 1845. TYPE: Peru?, *Poeppig* 189 (not seen), according to Reed (Mem. Soc. Brot. 18:105. 1965–1966).

Plants terrestrial, at 0–100 m elevation, in wet forests, from the Depto. Chocó. Also from other areas in Colombia and Ecuador to Peru.

59. *Selaginella haematodes* (Kunze) Spring in Mart. Fl. Bras. 1(2):126. 1840.

Lycopodium haematodes Kunze, Linnaea 9:9. 1834. TYPE: Tocache Mission, upper Río Huallaga, Depto. S. Martín, Peru, June 1830, *Poeppig* (LZ destroyed).

Selaginella filicina Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:189. 1849. SYNTYPES: Between Puerto Cabello and Valencia, Edo. Carabobo, Venezuela, 2000–3000 ft, *Linden* (BR not seen); “Prov. Caracas,” Venezuela, 3000 ft, *Linden* 3313 (LG not seen); and Peru, *Mathews* (K not seen).

Plants terrestrial, at 0–600 m elevation, in wet forests, from scattered localities in central Panama through the Chocó. Also from Venezuela to Bolivia.

60. *Selaginella hoffmannii* Hieron. Hedwigia 41:184. 1902.

SYNTYPES: Near Aguacate, Pcia. S. José, *Hoffmann* 905, 905a, and 909 (all B none seen), and others from Mexico and Guatemala.

Plants terrestrial, at 100–1000 m elevation, in moist or seasonally dry places, from Nicoya (Pcia. Guanacaste), the western slopes of the Cordillera Central, the valley of the Río Reventazón near Turrialba (Pcia. Cartago), and the vicinity of Boquete. Also from Mexico to Nicaragua.

61. *Selaginella horizontalis* (K. Presl) Spring, Bull. Acad. Roy. Sci. Bruxelles 10:226. 1843.

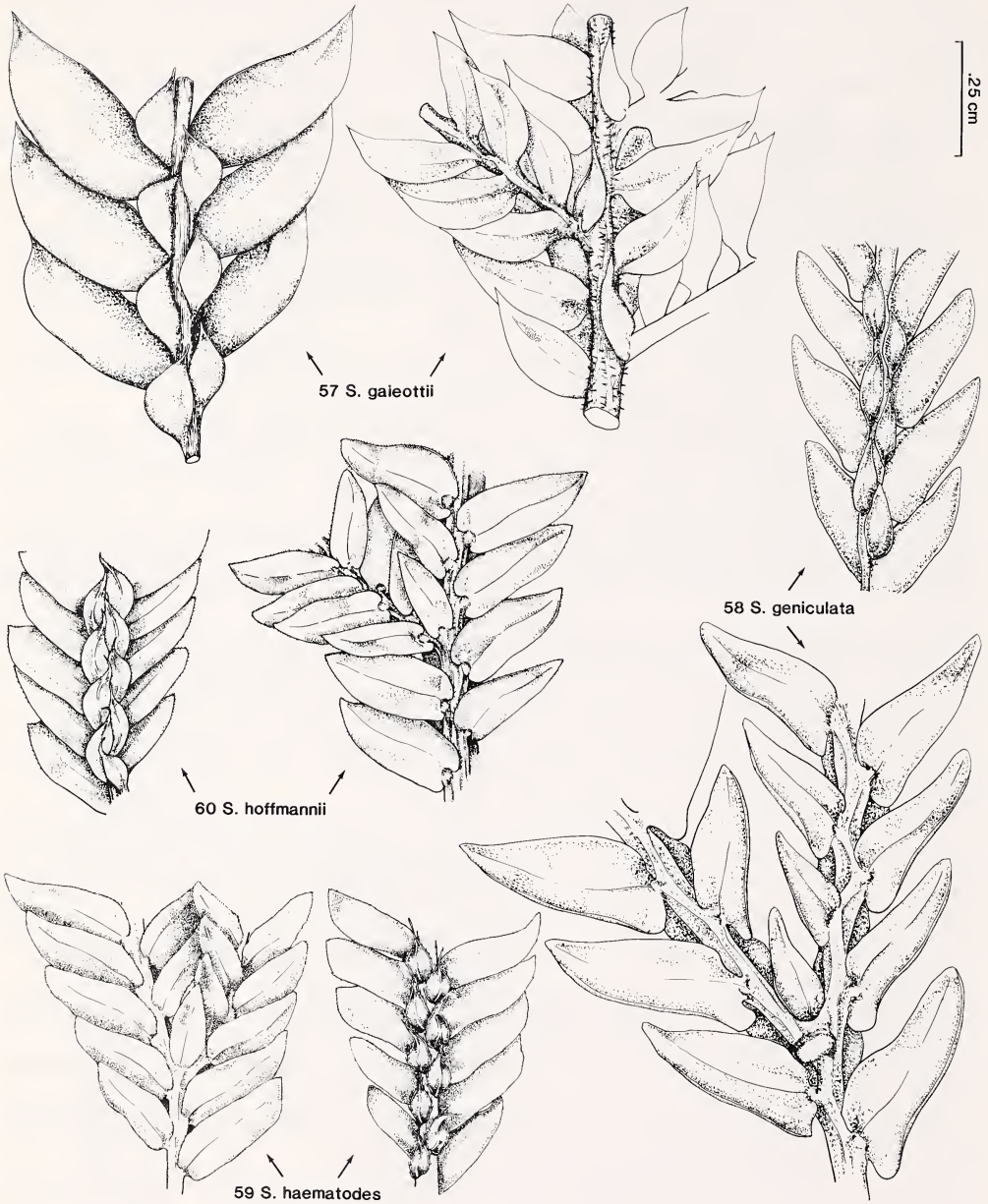
Lycopodium horizontale K. Presl, Reliq. Haenk. 78. 1825. TYPE: “Ex vallibus Cordilleris Peruanis,” *Haenke* (PRC not seen photo US).

Selaginella fendleri Baker, J. Bot. Brit. For. 21:334. 1883. TYPE: Chagres, Canal Zone, *Fendler* 382 (K not seen fragm NY; isotype MO).

Selaginella sylvatica Baker, J. Bot. Brit. For. 22:25. 1884. TYPE: Near Panama City, Pcia. Panama, *Seemann* 31 (K not seen fragm NY).

Plants terrestrial, at 0–800(1100) m elevation, in forests, from scattered localities in the Cordillera Central, near Platanillo (Pcia. Cartago), and

FIGS. 53–56. *Selaginella*. FIG. 53. Branch portions of *S. estrellensis*, Standley 35620. FIG. 54. Branch portions of *S. eurynota*, Standley & Valerio 47175. FIG. 55. Branch portions of *S. exaltata*, Stern et al. 129. FIG. 56. Branch portions of *S. flagellata*, Killip 39970.



throughout Panama and the Chocó. Also from Venezuela and other localities in Colombia.

Singer et al. (Science 172:1341–1342. 1971) reported that this plant serves as food for the larvae of the butterfly *Euptychia westwoodi* Butler.

62. *Selaginella huehuetenangensis* Hieron. Hedwigia 43:32. 1904.

SYNTYPES: Between Sta. Cruz Almor and Ixcán, Depto. Huehuetenango, Guatemala, *Bernoulli & Cario* 178 (B not seen); and between Dolores and Jachichá, Depto. Alta Verapaz, Guatemala, *Bernoulli & Cario* 183 (B not seen).

Plants terrestrial, often on roadside banks, at 0–700(1400) m elevation, mostly in lowland forests, from the Cordillera de Tilarán, the Cordillera Central, and the Llanuras de S. Carlos to Pcia. Darién. Also from Mexico to Honduras, and Nicaragua.

63. *Selaginella idiospora* Alston, Bull. Brit. Mus. (Nat. Hist.), Bot. 1:246. 1955.

TYPE: Along the Saklak River below Secanquim, Depto. Alta Verapaz, Guatemala, 550 m, *Pittier* 191 (BM not seen; isotype US).

Plants terrestrial, at 600–800 m elevation, in forests, from the Cordillera de Tilarán to the western slopes of the Cordillera Central. Also from Mexico to Honduras.

64. *Selaginella kunzeana* A. Braun, Ann. Sci. Nat. Bot. V, 3:296. 1865.

TYPE: Braun cites several syntypes, some from Peru and some with a query. The others, which are from the Prodrum area, are: Near La Palma, Depto. Cundinamarca, Colombia, *Triana* 3 (B not seen); and Muzo, Minas, Depto. Boyacá, Colombia, 700 m, *Lindig* 1513 (B not seen).

Plants terrestrial, at 0–600(1000) m elevation, mostly in lowland forests, often on exposed banks, from the Cordillera Central, the Cordillera de Talamanca, the Fila Costeña, west of Cerro Pando (Pcia. Chiriquí), and the Chocó. Also from Mexico, Honduras, Venezuela, and other localities in Colombia to Peru.

This species is closely allied to *S. eurynota* and *S. sertata*.

65. *Selaginella longissima* Baker, J. Bot. Brit. For. 19:208. 1881.

TYPE: Depto. Antioquia, Colombia, 3000 ft, *Kalbreyer* 1815 (K not seen).

Plants hemiepiphytic, at 0–1800 m elevation, from the Chocó. Also from other areas in western Colombia.

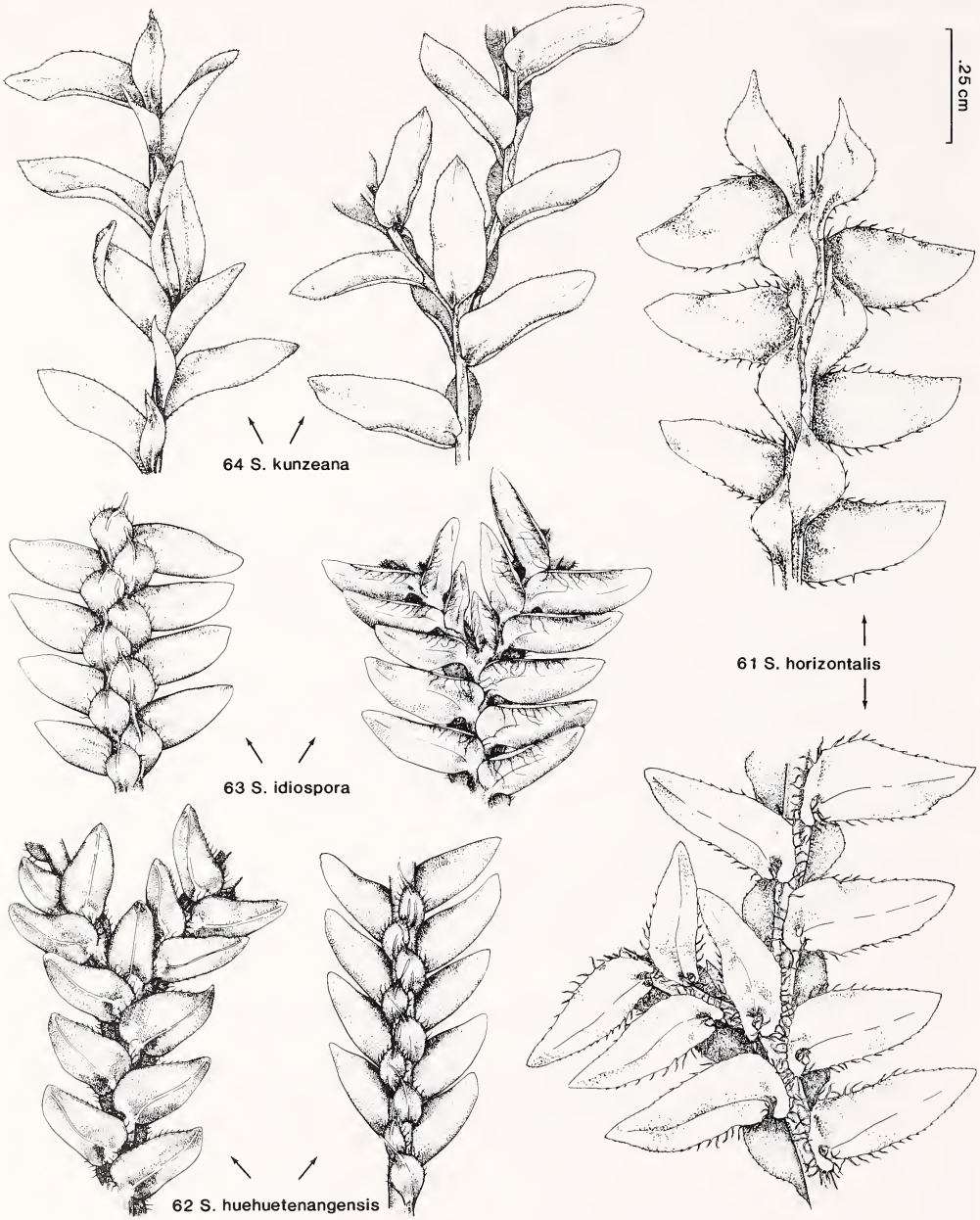
66. *Selaginella lychnuchus* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:247. 1849.

Selaginella lychnuchus var. *flaccida* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:248. 1849. TYPE: Galipán, Distr. Fed., Venezuela, *Moritz* 71 (LG not seen; isotype BM not seen photo 6523).

Selaginella lychnuchus var. *rigidiuscula* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:248. 1849, nom. superfl. TYPE: A renaming of the typical variety, and so based on the type of the species name.

Selaginella lychnuchus var. *pusilla* A. Braun, Ann. Sci. Nat. Bot. V, 3:288. 1865. TYPE: Caracas, Distr. Fed., Venezuela, *Gollmer* (B not seen).

FIGS. 57–60. *Selaginella*. FIG. 57. Branch portions of *S. galeottii*, Pittier 1820. FIG. 58. Branch portions of *S. geniculata*, Haught 5495. FIG. 59. Branch portions of *S. haematodes*, Burch et al. 1079. FIG. 60. Branch portions of *S. hoffmannii*, Cornman 1167.



TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz* 378 (B not seen; isotype BM not seen photo 6525).

Plants terrestrial, at 1200–1700 m elevation, from near S. Ramón, La Hondura and Cerro Tablazo (both Pcia. S. José), and Tapantí. Also from Venezuela.

67. *Selaginella martensii* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:129. 1849.

Selaginella solmsii Baker, Handb. Fern-allies 56. 1887. TYPE: Guatemala, *Bernoulli & Cario* 181 (K not seen).

LECTOTYPE: Near Jalapa and Mirador, Edo. Veracruz, Mexico, *Galeotti* 6606bis (LG not seen; isolectotype “6606” BR not seen), chosen by Gregory and Riba (Fl. Veracruz 6:16. 1979).

Plants terrestrial, at (700)1300–2500 m elevation, in forests, from the Cordillera Central, the north end of the Cordillera de Talamanca, around Boquete, from La Mesa to El Valle, and the Serranía de Pirre near Cana (Pcia. Darién). Also from Mexico to Nicaragua.

The median leaves of this species have longer aristae than do those of the superficially similar *S. oaxacana*.

68. *Selaginella microphylla* (H.B.K.) Spring, Bull. Acad. Roy. Sci. Bruxelles 10:234. 1843.

Lycopodium microphyllum H.B.K. Nov. Gen. Sp. 1:39 (fol. 32). 1816. TYPE: Near Quilquase, Depto. Cauca, Colombia, 1004 hexap, *Humboldt & Bonpland* (B not seen; presumable isotype P not seen photo 3347).

Selaginella thujifolia Spring in Mart. Fl. Bras. 1(2):120. 1840, as “*thujaefolia*.” TYPE: Montevideo, Uruguay, *Sellow* (BR? not seen).

Selaginella jamesonii Baker, J. Bot. Brit. For. 21:97. 1883. SYNTYPES: Near Quito, Ecuador, *Jameson* 312 (K not seen) and *Sodi* (not seen).

Selaginella schmidtchenii Hieron. Hedwigia 43:40. 1904. TYPE: Colombia, *Schmidtchen* in 1882 (B not seen).

Plants terrestrial or epipetric, at 0–500 m elevation, in lowland wet to moist forests, from the S. Ramón–S. Mateo road (Pcia. Alajuela), the Peninsula de Osa, and S. José Island (Pcia. Panama). Also from Venezuela, Ecuador and Colombia to Argentina, Paraguay, Uruguay, and Brazil.

69. *Selaginella minima* Spring, Bull. Acad. Roy. Sci. Bruxelles 10:139. 1843.

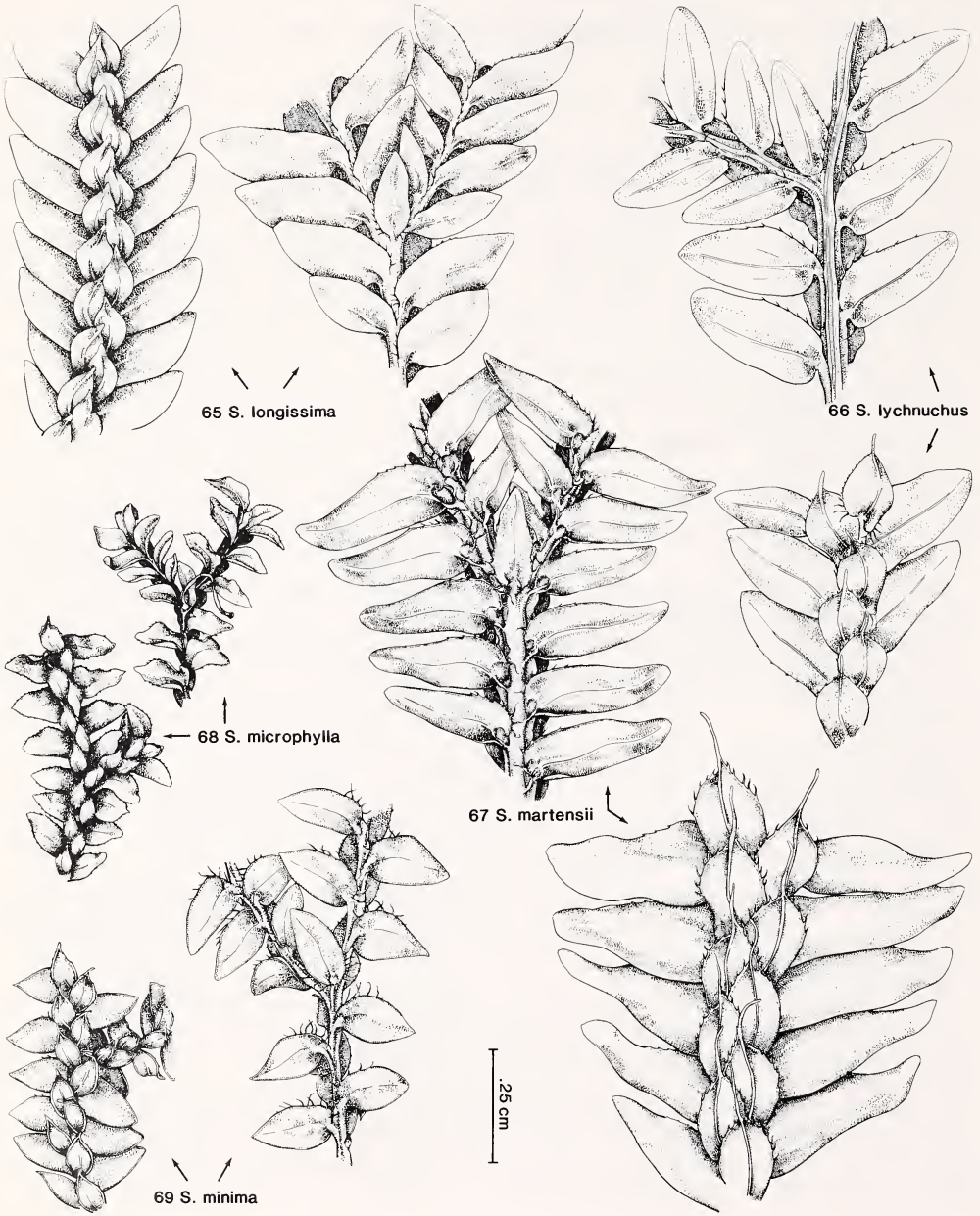
TYPE: Mt. Eigre, Ile de Cayenne, French Guiana, *Leprieur* 158 (LG not seen; isotypes G, K, NY, and P none seen, US).

Plants terrestrial, often on banks, at 0–1300 m elevation, in grassy areas, from the Río Rosales, Grecia, and La Palma de S. Ramón (all Pcia. Alajuela) and S. José Island (Pcia. Panama). Also from French Guiana.

70. *Selaginella mollis* A. Braun, Ann. Sci. Nat. Bot. V, 3:276. 1865.

Selaginella illecebrosa Alston, Bull. Brit. Mus. (Nat. Hist.), Bot. 1:239, t. 5, f. A–E. 1955. TYPE: Along lower part of stream tributary to the Río Frio, Depto. Izabal, Guatemala, 75–150 m, *Steyermark* 41579 (BM not seen; isotypes NY, US).

FIGS. 61–64. *Selaginella*. FIG. 61. Branch portions of *S. horizontalis*, Aviles 2. FIG. 62. Branch portions of *S. huehuetenangensis*, Chrysler 5172. FIG. 63. Branch portions of *S. idiospora*, Burger & Stolze 5110. FIG. 64. Branch portions of *S. kunzeana*, Tonduz 4678.



TYPE: "Prov. Ocaña," Depto. Norte de Santander, Colombia, 4000–6000 ft, *Schlim 1029* (G not seen; isotype K not seen).

Plants terrestrial, often on banks, at 0–600 m elevation, in wet forests, from the lowlands and foothills of Costa Rica, Panama, and the northern Chocó. Also from Mexico, Nicaragua, and Colombia adjacent to the Chocó.

71. *Selaginella novae-hollandiae* (Swartz) Spring, Bull. Acad. Roy. Sci. Bruxelles 10:234. 1843.

Lycopodium novae-hollandiae Swartz, Syn. Fil. 184, 410. 1806. TYPE LOCALITY: "Australia" [probably western South America].

Plants terrestrial, at 0–900 m elevation, often on banks in open areas, from the Atlantic lowlands, the Cordillera Central, and the Meseta Central to Pcia. Darién. Also from Nicaragua, Venezuela, Colombia to Bolivia, and Argentina.

72. *Selaginella oaxacana* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:177. 1849.

Lycopodium flabellatum var. *strictum* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:12. 1842. TYPE: Chinantla, Edo. Oaxaca, Mexico, *Galeotti 6608* (BR not seen).

Selaginella wendlandii Hieron. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):683. 1901. LECTOTYPE: Near S. Miguel, Costa Rica, *Wendland 771* (B not seen), chosen by Alston (Bull. Brit. Mus. (Nat. Hist.), Bot. 1:277. 1955).

?*Selaginella costaricensis* Hieron. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):683. 1901. TYPE LOCALITY: Costa Rica. Synonymized by Alston (Bull. Brit. Mus. (Nat. Hist.), Bot. 1:237. 1955).

TYPE: Chinantla, Edo. Oaxaca, Mexico, *Galeotti 6608bis* (LG? not seen; isotypes "6608" BR not seen, P not seen).

Plants terrestrial, at 0–1600 m elevation, on banks, often along streams, from the Cordillera de Tilarán and the Cordillera Central to El Valle, the Serranía de Pirre above Cana, and the central Chocó. Also from Mexico to Honduras, Nicaragua, other localities in Colombia, and Ecuador.

73. *Selaginella pallescens* (K. Presl) Spring in Mart. Fl. Bras. 1(2):132. 1840.

Lycopodium pallescens K. Presl, Reliq. Haenk. 1:79. 1825. TYPE: Mexico, *Haenke* (PRC not seen).

Lycopodium cuspidatum Link, Hort. Reg. Bot. Berol. 2:161. 1833. TYPE: From material cultivated at the Botanical Garden in Berlin, originally from Mexico (B not seen).

Selaginella cuspidata var. *elongata* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:67. 1849. TYPE LOCALITY: Guatemala.

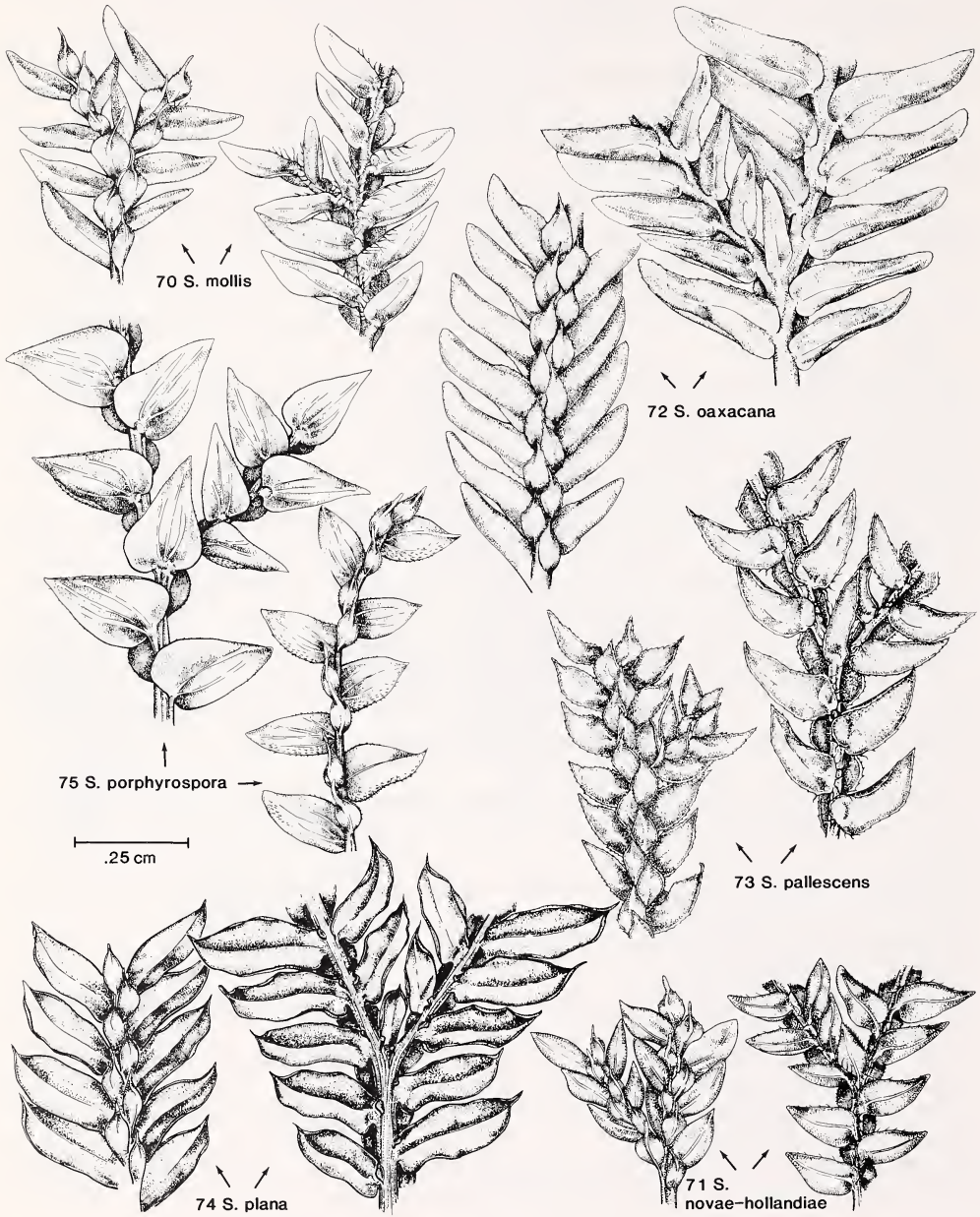
Selaginella incana Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:157. 1849. TYPE: Realejo, Nicaragua, *Sinclair* (K not seen).

Selaginella emmeliana van Geert, Rév. Hort. 10:220, f. 20. 1884. TYPE: Quinquina [Cinchona?], South America, *Emmel* (BR? not seen).

Selaginella microdendron Baker, J. Bot. Brit. For. 23:116. 1885. TYPE: Cuba, *Wright 3910* (K not seen; isotypes BM not seen, US).

Selaginella harrisii Underw. & Hieron. in Urban, Symb. Antill. 7:162. 1912. TYPE: Jamaica, *Harris 7587* (NY not seen; isotypes BM, IJ, K none seen).

FIGS. 65–69. *Selaginella*. FIG. 65. Branch portions of *S. longissima*, Archer 1999. FIG. 66. Branch portions of *S. lychnuchus*, Biolley. FIG. 67. Branch portions of *S. martensii*, Killip 5251. FIG. 68. Branch portions of *S. microphylla*, Erlanson 164. FIG. 69. Branch portions of *S. minima*, Johnston 878.



Plants epipetric or terrestrial, at 100–1300(2000) m elevation, in moist to dry, shady to open places, often on walls or clay banks, from the Pacific side of the Cordillera de Tilarán, Cartago and Orosi (Pcia. Cartago), Cerro de Piedra Blanca (Pcia. S. José), the west and south sides of the Cordillera de Talamanca to Pcia. Veraguas, and the vicinity of Cerro Jefe. Also from Jamaica, Mexico to Nicaragua, Venezuela, and Colombia.

This species is variable in its habit, and includes both arborescent and rosette forms. At lower elevations it is commonly associated with *Adiantum concinnum*.

74. *Selaginella plana* (Desv. ex Poir.) Hieron. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):703. 1901.

Lycopodium planum Desv. ex Poir. Enc. Méth. Suppl. 3:554. 1814. TYPE: India orientalis, collector unknown (presumably P-Hb. Desv. not seen).

Plants terrestrial, at 0–700 m elevation, naturalized in waste places and plantations, from Limón and Moin (Pcia. Limón) and Cerro Campana (Pcia. Panama). Also naturalized in Jamaica, Puerto Rico, the Lesser Antilles, Trinidad, and Brazil.

According to B. McAlpin (pers. comm.), the similar *S. uncinata* (Desv.) Spring occurs at the Summit Botanical Garden in the Canal Zone, but apparently has not yet escaped.

75. *Selaginella porphyrospora* A. Braun, Ann. Sci. Nat. Bot. V, 3:286. 1865.

Selaginella bulbifera Baker, Gard. Chron. 1867: 783, 950. 1867. TYPE: Presumably based on material cultivated at Kew (K not seen).

Selaginella binervis Liebm. ex Baker, J. Bot. Brit. For. 22:112. 1884. TYPE: Dos Puentes, S. Antonio Huatusco, Edo. Veracruz, Mexico, *Liebmann* (K not seen; isotype C not seen).

Selaginella bernoullii Hieron. Hedwigia 41:192. 1902. SYNTYPES: Between Cubulco and Joyabaj, Depto. Quiché, Guatemala, *Bernoulli 1121* (B not seen) and *Bernoulli & Cario 160* (B not seen).

TYPE: Edo. Veracruz, Mexico, *Sartorius* (B not seen fragm BM not seen).

Plants terrestrial or epipetric, at (400)1200–2100 m elevation, often on banks, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico to Nicaragua, and Venezuela.

Some specimens from the Flora area have atypical, 1-nerved leaves.

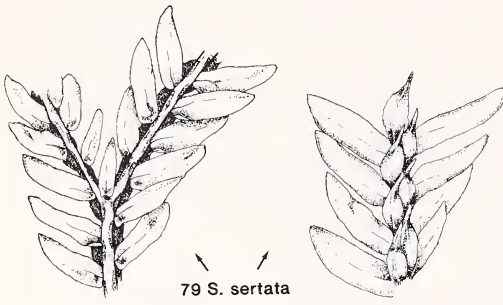
76. *Selaginella producta* Baker, J. Bot. Brit. For. 21:243. 1883.

Selaginella tobagensis Hieron. in Urban, Symb. Antill. 3:524. 1903. TYPE: Morne d'Or, Tobago, 1200 ft, *Eggers 5815* (B not seen; isotype US).

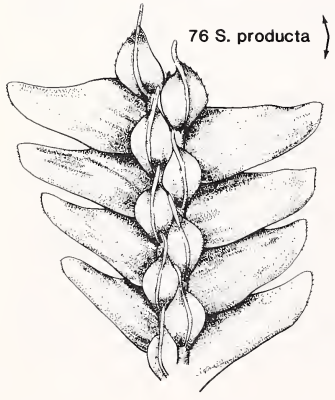
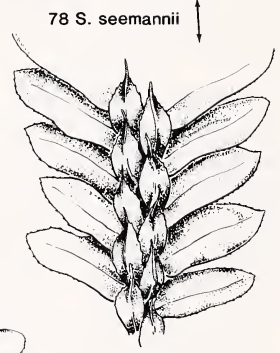
SYNTYPES: British Guiana, *Appun, Drake*; Amazon Valley, Est. Amazonas, Brazil, *Spruce 2043*; Est. Minas Gerais, Brazil, *Lindberg* (all K none seen).

Plants terrestrial, at 0–100 m elevation, in rain forests, in the Flora area known only from La Concepción, 15 km E of Quibdó, Depto. Chocó (*Archer 1996*, US). Also from other localities in Colombia, Venezuela, Trinidad, Tobago, Brazil and the Guianas, and Peru.

FIGS. 70–75. *Selaginella*. FIG. 70. Branch portions of *S. mollis*, Wagner. FIG. 71. Branch portions of *S. novae-hollandiae*, Burch et al. 1088. FIG. 72. Branch portions of *S. oaxacana*, Lellinger 909. FIG. 73. Branch portions of *S. pallescens*, Haupt 73. FIG. 74. Branch portions of *S. plana*, McAlpin 2434. FIG. 75. Branch portions of *S. porphyrospora*, Brown CR-233.



2.5 cm



77. *Selaginella revoluta* Baker, J. Bot. Brit. For. 21:141. 1883.

Selaginella platybasis Baker, J. Bot. Brit. For. 21:242. 1883. TYPE: Near Panuré, Est. Amazonas, Brazil, *Spruce* 2502 (K not seen).

Selaginella demissa Christ, Bull. Herb. Boissier II, 1:75. 1900. TYPE: Cerro de Canchahuaya, Ocajali, Depto. Loreto, Peru, *Huber* 1421 (P not seen).

TYPE: Near Maupures, along the Río Ornioco, Edo. Amazonas, Venezuela, *Spruce* 3621 (K not seen; isotypes BM not seen, CGE not seen, US).

Plants terrestrial, at 0–1000 m elevation, in forests, from along the Pan American Highway above S. Isidro del General, El Valle, and the Canal Zone. Also from Venezuela to the Guianas and Brazil, Colombia, and Peru.

78. *Selaginella seemannii* Baker, J. Bot. Brit. For. 21:244. 1883.

Selaginella barbacosensis Hieron. Hedwigia 43:46. 1904. TYPE: Near Barbacoas, Depto. Nariño, Colombia, *Lehmann* 89 (B not seen).

TYPE: Cachual Island, mouth of the Río S. Juan, *Seemann* 1006 (K not seen; isotype BM not seen photo 6517).

Plants terrestrial, at ca. 0 m elevation, in the Flora area known only from the type locality. Also from Colombia and Peru.

79. *Selaginella sertata* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:104. 1849.

Selaginella nicaraguensis Baker, J. Bot. Brit. For. 21:333. 1883. TYPE: Grenada, Nicaragua, *Levy* 360 (K not seen fragm NY).

TYPE: Panama [Nicoya, Pcia. Puntarenas, Costa Rica], *Sinclair* (K not seen fragm B not seen).

Plants terrestrial, at 0–300(900) m elevation, in moist and wet forests, from the Pacific-facing and coastal slopes of central Costa Rica, the Peninsula de Nicoya, S. Felix to Cerro Flor (Pcia. Chiriquí), and the Canal Zone. Also from Mexico to Nicaragua and Colombia.

80. *Selaginella silvestris* Aspl. Ark. Bot. 20A(7): 30, f. 3–5. 1926.

TYPE: El Chaco, S. Yungas, Depto. La Paz, Bolivia, 1900 m, *Asplund* 1140 (UPS not seen).

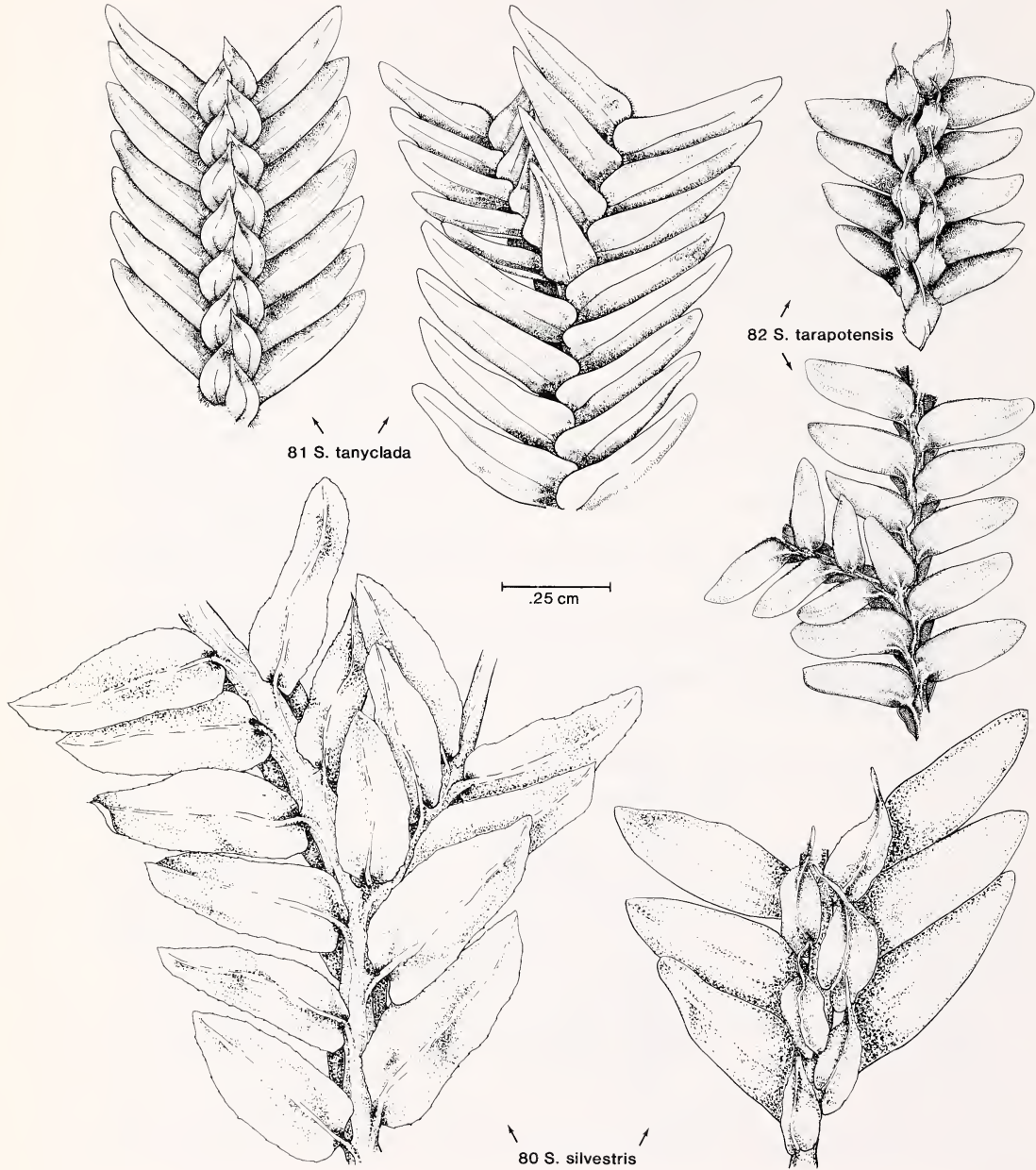
Plants terrestrial, at 0–2400 m elevation, in forests, from the Cordillera de Tilarán to the northern foothills of the Cordillera de Talamanca, the Atlantic lowlands of Bocas del Toro to the Canal Zone, the mountains beyond La Pintada (Pcia. Coclé), and between Bahía Solano and El Valle (Depto. Chocó). Also from Mexico to Nicaragua and other localities in Colombia to Bolivia.

81. *Selaginella tanyclada* Alston ex Crabbe & Jermy, Amer. Fern J. 63:143. 1973.

TYPE: La Concepción, 15 km E of Quibdó, Depto. Chocó, ca. 75 m, *Archer* 1966 (US fragm BM not seen).

Plants terrestrial, at 0–1000 m elevation, in forests, from Campo Tres (Pcia. Panama), the type locality, and Alto del Buey (9 June 1940, *von Sneider*n, S not seen).

FIGS. 76–79. *Selaginella*. FIG. 76. Branch portions of *S. producta*, *Archer* 1996. FIG. 77. Branch portions of *S. revoluta*, *Steyermarck & Allen* 17469. FIG. 78. Branch portions of *S. seemannii*, *Killip & Smith* 29638, Peru. FIG. 79. Branch portions of *S. sertata*, *Lankester* 603.



82. *Selaginella tarapotensis* Baker, J. Bot. Brit. For. 21:98. 1883.

Selaginella faucium Liebm. ex Baker, Handb. Fern-allies 58. 1887. TYPE: Huitamalco and Hacienda de Jovo, Edo. Veracruz, Mexico, *Liebm. Pl. Mex.* 2048 (K not seen fragm NY).

TYPE: Mt. Guayapurima, near Tarapoto, Depto. S. Martín, Peru, *Spruce* 4625 (K not seen; isotypes BM, CGE, LE none seen; US).

Plants terrestrial, at 500–2700 m elevation, in forests, from the Cordillera Central, Cerro Tute (Pcia. Veraguas), and Pcia. Darién. Also from Colombia to Bolivia.

83. *Selaginella tomentosa* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:231. 1849.

TYPE: Gorgona Island, Colombia, *Hinds* (LG not seen; isotype K not seen).

Plants terrestrial, at 0–300 m elevation, in forests, from the Depto. Chocó. Also from other areas of western Colombia.

84. *Selaginella tuberosa* McAlpin & Lellinger, Brenesia 24:409. 1986.

TYPE: Las Alturas de Cotón, Pcia. Puntarenas, *McAlpin* 2505 (US; isotypes CR, DUKE, NY).

Plants terrestrial, at ca. 1500 m elevation, in moist forests, known only from the type locality.

This species is peculiar in having large, elongate, annual tubers borne at the end of underground stems. The tubers form at the end of the wet season, the plants die down at in the dry season, and new growth appears from the tubers at the beginning of the following wet season.

85. *Selaginella umbrosa* Lemaire ex Hieron. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):683, f. 404. 1901.

Selaginella erythropus var. *major* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24:156. 1849. TYPE: Guatemala, *Skinner* (K not seen).

Selaginella lemairei Hieron. *Hedwigia* 58:287. 1917, nom. illeg. TYPE: A renaming of *S. umbrosa* Lemaire ex Hieron., and so based on the type of that name.

TYPE: Not stated; perhaps best considered a renaming of *S. erythropus* var. *major*, and so based on the type of that name.

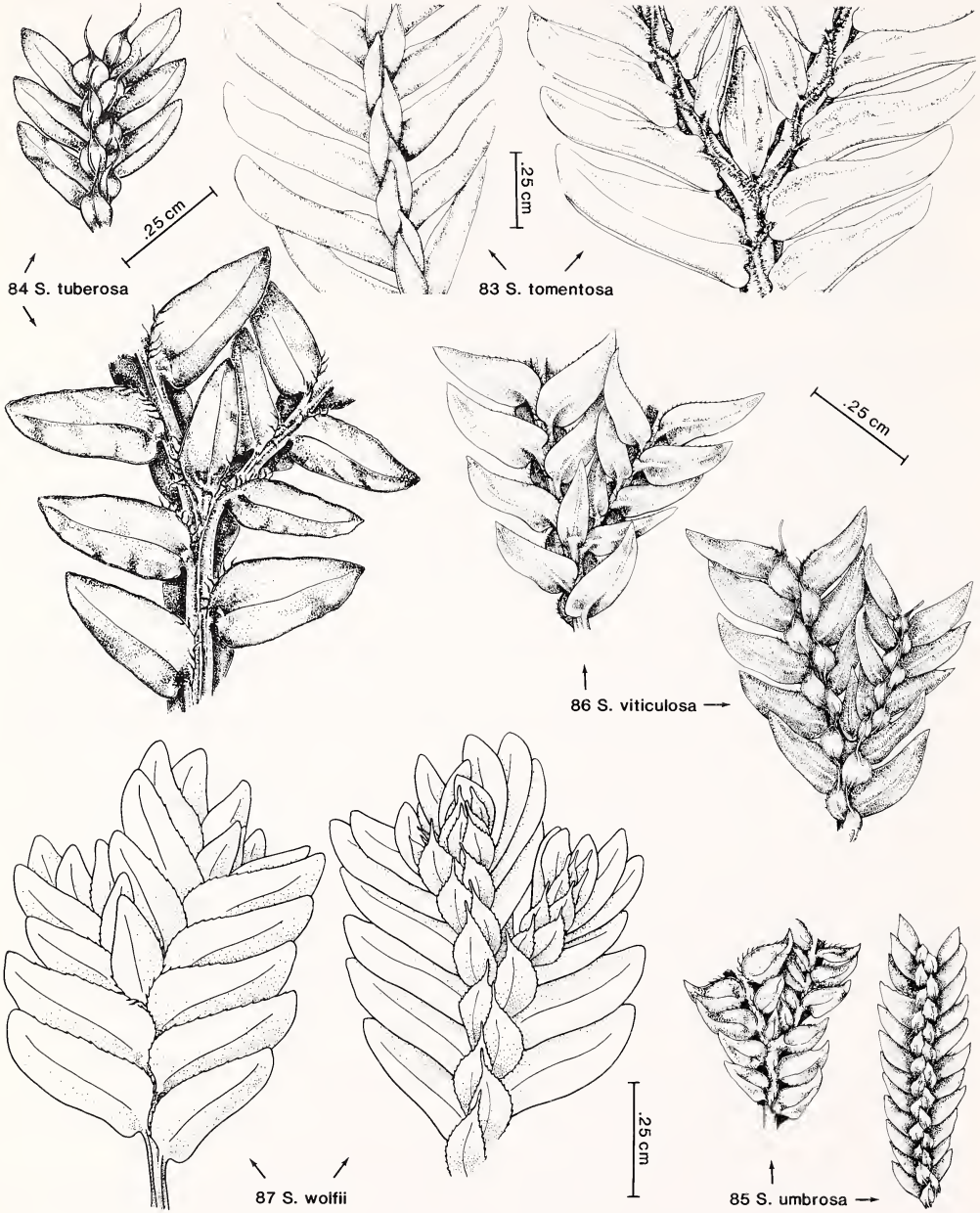
Plants terrestrial, at 0–700 m elevation, often in open areas, from the Llanura de Tortuguero, the valley of the Río General, the Atlantic coastal plain of Panama to the Canal Zone, Pcia. Colón, and adjacent Pcia. Panama, and around Quibdó. Also from the Lesser Antilles, Mexico to Honduras, Nicaragua, Venezuela, and Colombia.

86. *Selaginella viticulosa* Klotzsch, Linnaea 18:524. 1845.

SYNTYPES: La Guiara, Distr. Fed., Venezuela, *Otto* 460 (B not seen) and *Moritz* 70 (B not seen; isotype BM not seen photo 6512).

Plants terrestrial, at 0–500(1000) m elevation, from near S. Ramón, the Peninsula de Nicoya, the Peninsula de Osa, and scattered localities in lowland Panama. Also from Venezuela and Colombia.

FIGS. 80–82. *Selaginella*. FIG. 80. Branch portions of *S. silvestris*, Biolley 7507. FIG. 81. Branch portions of *S. tanyclada*, Archer 1966. FIG. 82. Branch portions of *S. tarapotensis*, Pittier 5639.



87. *Selaginella wolfii* Sodiro, Anal. Univ. Quito 12(83): 490 (repr. 620). 1895.

TYPE: Cordillera Occidental, Ecuador, 1800 m, *Sodiro* (P not seen).

Plants terrestrial, at 0–1500 m elevation, from Bahía Solano and the central Depto. Chocó. Also from Ecuador and Peru.

This species is close to *S. bombycina* and to *S. oaxacana*.

FIGS. 83–87. *Selaginella*. FIG. 83. Branch portions of *S. tomentosa*, Killip & García 33151. FIG. 84. Branch portions of *S. tuberosa*, McAlpin 2505. FIG. 85. Branch portions of *S. umbrosa*, Hart 11. FIG. 86. Branch portions of *S. viticulosa*, Burger & Stolze 5411. FIG. 87. Branch portions of *S. wolfii*, Haught 5525.

ISOËTACEAE

Monotypic; see description of *Isoëtes*.

4. ISOËTES L.

Plants aquatic, amphibious, or terrestrial in vernal pools, rooted in mud or sometimes gravelly soil; roots and leaves borne on 2- or 3-lobed, erect, usually subterranean, indeterminate, globular, corm-like stems; roots rather fleshy, borne in longitudinal lines on the outer and basal faces of the corms; leaves rush-like, erect or spreading, crowded, borne on the apical and outer surfaces of the corms, triangular or terete, with an unbranched midrib, 0–several longitudinal strands of thickened supporting cells, and longitudinal air chambers divided by lateral septae; fertile leaves swollen at the base, bearing an adaxial, embedded sporangium often partially or entirely covered by a scarious velum and a usually triangular ligule just distal to the sporangium; sporangia of 2 types, the megasporangia bearing a few large, spherical, white, often highly ornamented megaspores, the microsporangia bearing many minute, usually ellipsoid, tan microspores.

Widespread in temperate and tropical regions; ca. 100–200 species. The genus is the only extant representative of the Lycopsida subclass Isoëtidae, which has a long fossil record. The peculiar morphology of *Isoëtes* has made it the object of much study (Karrfalt, 1980; Paolillo, 1963). Some of the species show physiological adaptations to their hot and sunny habitat (Keeley, 1981). The taxonomy of this genus is difficult but is made easier through examination of mature spores with the scanning electron microscope. The tropical American species of the genus are currently under study by H. P. Fuchs-Eckert (1982) and R. J. Hickey (1986). According to Hickey (pers. comm.), the upland populations of southern Central America all differ slightly from one another, as do the lowland ones, and it is best to treat each of the two groups as a single species, rather than to name several populations of each as separate species.

FUCHS-ECKERT, H. P. 1982. Zur heutigen Kenntnis von Vorkommen und Verbreitung der südamerikanischen Isoëtes-Arten. Proc. K. Nederl. Akad. Wetensch. C, 85:205–260.

HICKEY, R. J. 1986. Isoëtes megaspore surface morphology: nomenclature, variation, and systematic importance. Amer. Fern J. 76:1–16.

KARRFALT, E. E. 1980. A further comparison of Isoetes roots and stigmarian appendages. Canad. J. Bot. 58:2318–2322.

KEELEY, J. E. 1981. Diurnal acid metabolism in vernal pool Isoetes (Isoetaceae). Madroño 28:167–171.

PAOLILLO, D. J. 1963. The developmental anatomy of Isoetes. Illinois Biol. Monogr. 31:1–130.

PFEIFFER, N. E. 1922. Monograph of the Isoetaceae. Ann. Missouri Bot. Gard. 9:79–232.

1. Leaves 30–55 cm long, the ala 2–5 mm wide distal to the leaf base, hyaline or whitish, sometimes faintly brown-edged, 9–12 cm long; ligule deltate, 3–6 mm long; velum covering less than half of the sporangium; mature megaspores 0.35–0.60 mm in diam., tuberculate.

88. *I. panamensis*

1. Leaves 5–30 cm long, the ala up to 1 mm wide distal to the leaf base, brown-edged or occasionally pale, 1–5 cm long; ligule deltate to lanceolate, 1.5–4 mm long; velum small to complete; mature megaspores 0.40–0.70 mm in diam., not tuberculate.

89. *I. storkii*

88. *Isoëtes panamensis* Maxon & Morton in Woodson & Seibert, Ann. Missouri Bot. Gard. 26:272. 1939.

Isoëtes pacifica Svenson, Amer. Fern J. 34:123, t. 10. 1944. TYPE: East of Chanduy, Pcia. Guayas, Ecuador, *Svenson 11002* (BKL not seen), synonymized by Stolze (Fieldiana, Bot. N.S., 12:66. 1983).

Isoëtes savannarum Gómez, Phytologia 49:339. 1981. TYPE: Near Tanque, La Cruz, Pcia. Guanacaste, ca. 200 m, *Gómez 7350* (CR; isotype US? not seen).

TYPE: Vicinity of Bejuco, Pcia. Panama, *Woodson, Allen & Seibert 1685* (US; isotype NY).

Plants aquatic, at 0–200 m elevation, in temporary pools in grasslands, from northwestern Costa Rica and Pcia. Panama. Also from Guatemala, Ecuador, and Peru.

89. *Isoëtes storkii* Palmer, Amer. Fern J. 22:136. 1932.

Isoëtes montana Palmer, Amer. Fern J. 21:134. 1931, non Weber, 1922, nom. illeg. TYPE: Poás Lake, Pcia. Alajuela, 8500 ft, *Stork 2361* (US; isotypes GH, NY).

Isoëtes tryoniana Gómez, Revista Biol. Trop. 17:108, f. 8. 1970. TYPE: Large lake on Chirripó Grande, Pcia. S. José, 3300 m, *Gómez PtC-1032* (CR not seen).

TYPE: A renaming of *I. montana* Palmer, and so based on the type of that name.

Plants aquatic, at 2500–3700 m elevation, in pools in páramos and montane bogs, from Volcán Poás, and the Cordillera de Talamanca to Pcia. Bocas del Toro.

EQUISETACEAE

Monotypic; see description of *Equisetum*.

5. EQUISETUM L.

Plants terrestrial, often in wet places; rhizomes subterranean, blackish, wide-creeping with wiry roots, branched, bearing erect stems at their nodes; erect stems cylindrical, hollow, unbranched or with few to many branchlets in a whorl at some or all nodes; erect stems and branchlets gray-green, hollow between the nodes, slightly fluted, tough and harsh from silica deposited in the cell walls; leaves reduced, connate laterally to form nodal sheaths with often scarious and deciduous distal teeth; sporophylls highly modified (peltate) and aggregated to form strobili terminal on the branches or branchlets; sporangia ca. 6 per sporophyll, dehiscent adaxially; spores of 1 size, spherical, greenish, bearing 4 hygroscopic, coiled bands (elaters).

Widespread in temperate and to some extent tropical regions; 15 species plus many interspecific hybrids. The genus is the only extant representative of the ancient class Equisetopsida, which was especially conspicuous in the Carboniferous. The taxonomy of the genus has been well worked out by Hauke, but the identification of individual specimens remains difficult because of the minute characters and the frequent interspecific hybrids.

HAUKE, R. L. 1963. A taxonomic monograph of the genus *Equisetum* subgenus *Hippochaete*. Beih. Nova Hedwigia 8:1–123, t. 1–22.

———. 1966. A systematic study of *Equisetum arvense*. Nova Hedwigia 13:81–109, t. 1–9.

———. 1978. A taxonomic monograph of *Equisetum* subgenus *Equisetum*. Nova Hedwigia 30:385–455.

1. Erect stems 1–1.5 mm in diam., usually less than 0.5 m long, irregularly branched with 0–3(4) branches at a node.

90. *E. bogotense*

1. Erect stems 3.5–24 mm in diam., usually 2–8 m long, regularly branched with (0)5–30 or more branches at a node..2.

2(1). Ridges of branches bearing square tubercles; stomata (revealed by a drop of alcohol on the stem) in bands (2)3–4(5) rows wide. Stems up to 5 m long, 3.5–24 mm in diam.; strobili decidedly apiculate.

91. *E. giganteum*

2(1). Ridges of branches serrate, bearing triangular tubercles or the tubercles irregular; stomata in single rows or in bands 2(3) rows wide..3.

3(2). Stomata in single rows or in bands 2(3) rows wide; tubercles irregular to triangular. Stems up to 4.5 m long, 3–22 mm in diam.; strobili acute or slightly apiculate; spores abortive.

93. *E. ×schaffneri*

3(2). Stomata always in single rows; tubercles triangular. Stems up to 8 m long, 6–18 mm in diam.; strobili blunt or slightly apiculate.

92. *E. myriochaetum*90. *Equisetum bogotense* H.B.K. Nov. Gen. Sp. Pl. 1:42 (fol. 35). 1816.

Equisetum bogotense var. *flagelliforme* Kunze, Linnaea 9:4. 1834. TYPE: Antuco, Chile, Feb 1829, Poeppig (LZ destroyed).

Equisetum bogotense var. *nudum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 12:1245. 1862. TYPE: Six syntypes from Guatemala to Chile cited.

Equisetum bogotense var. *polystachum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 13:226. 1863. TYPE: Caracas, Distr. Fed., Venezuela, Moritz (Hb. Fée not seen).

Equisetum stipulaceum Vauch. Mém. Soc. Phys. Genève 1(2):377. 1872. TYPE: Peru, *Dombey* (P not seen).

Equisetum rinihuense Kunkel, Ber. Schweiz. Bot. Ges. 74:59. 1964. TYPE: Lago Rinihue, Pcia. Valdivia, Chile, *Kunkel 6436* (Hb. Kunkel? not seen; isotype K not seen).

TYPE: Near Sta. Fé de Bogotá and Alto del Roble, Distr. Esp., Colombia, 1360 hexap, *Humboldt & Bonpland* (P-Hb. H.B.K. not seen microfiche S. I. Library).

Plants terrestrial, at 1000–2900 m elevation, in pastures, roadside ditches, and on banks, from the Cordillera Central, the Fila de Cedral, Cerro Tablazo, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Venezuela and Colombia to Argentina and Chile.

91. *Equisetum giganteum* L. Sp. Pl. ed. 2, 2:1517. 1763.

Equisetum ramosissimum H.B.K. in Willd. Sp. Pl. ed. 4, 5:9. 1810, non Desf., 1799, nom. illeg. TYPE: Caracas, Distr. Fed., Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 19337 not seen microfiche S. I. Library).

Equisetum caracasenum DC. Fl. France 6:244, nota. 1815. TYPE: Caracas, Distr. Fed., Venezuela, *Vargas 49* in 1829 (P-Hb. DC. not seen).

Equisetum humboldtii Poir. Enc. Méth. Suppl. 4:549. 1816. TYPE: A renaming of *E. ramosissimum* H.B.K. in Willd., and so based on the type of that name.

Equisetum pyramidale Goldm. in Meyen, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19, Abh. 1:469. 1843. TYPE: Melipilla, Pcia. Santiago, Chile, *Meyen* (B? not seen).

Equisetum scandens Remy ex Gay, Hist. Fís. Polit. Chile, Bot. 6:471. 1854. TYPE: Quillota, Pcia. Valparaíso, Chile *Gay* (BR? or P? not seen).

Equisetum xylochaetum Mett. Fil. Lechl. 2:34. 1859. TYPE: Near Arica, Depto. Tarapacá, Chile, *Lechler 1556* (B not seen). The nom. nud. *Equisetum poeppigianum* A. Braun ex Mett. (Fil. Lechl. 1:27. 1856) is cited in synonymy.

Equisetum lechleri Milde, Verh. K. K. Zool.-Bot. Ges. Wien 11:350. 1861. TYPE: Near Arica, Pcia. Tarapacá, Chile, *Lechler 1556* (B not seen).

Equisetum martii Milde, Verh. K. K. Zool.-Bot. Ges. Wien 12:1258. 1862. SYNTYPES: Salgado, Est. Minas Gerais, Brazil, *Martius* in 1818 (M not seen photo 7777); and Caldas, Est. Minas Gerais, Brazil, 12 Sept 1854, *Lindberg* (BR not seen).

Equisetum martii var. *minus* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 12:1261. 1862. TYPE: Peru, *Gaudichaud 33* in 1834 (P-Hb. DC. not seen).

Equisetum brasiliense Milde, Verh. K. K. Zool.-Bot. Ges. Wien 12:1262. TYPE: Brazil, *Weddell 921* in 1858 (P-Hb. DC. not seen).

Equisetum elongatum var. *scaberrimum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 12:1264. 1862. TYPE: Valparaíso, Pcia. Valparaíso, Chile, *Jelinek* (W not seen).

Equisetum brasiliense f. *nudum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 13:228. 1863, as “*nuda*.” TYPE: Brazil, *Weddell* (P-Hb. DC. not seen). Presumably a superfluous name because based on the type of *E. brasiliense*; the correct name is f. *brasiliense*.

Equisetum brasiliense f. *ramosum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 13:228. 1863, as “*ramosa*.” TYPE: Sto. Domingo [Hispaniola], *de Tussac* (Hb. Fée not seen).

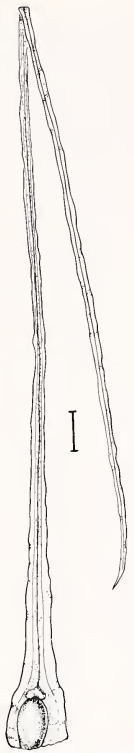
Equisetum giganteum var. *chilense* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 13:229. 1863, as “*chilensis*.” TYPE: Chile, *Gay* (Hb. Fée not seen).

Equisetum elongatum var. *affine* Milde, Ann. Mus. Bot. Lugduno-Batavum 1:68. 1864. TYPE: Santiago de Chile, Pcia. Santiago, Chile, *Philippi Pl. Chil. ed. Hohenacker 70* in 1859 (L? not seen).

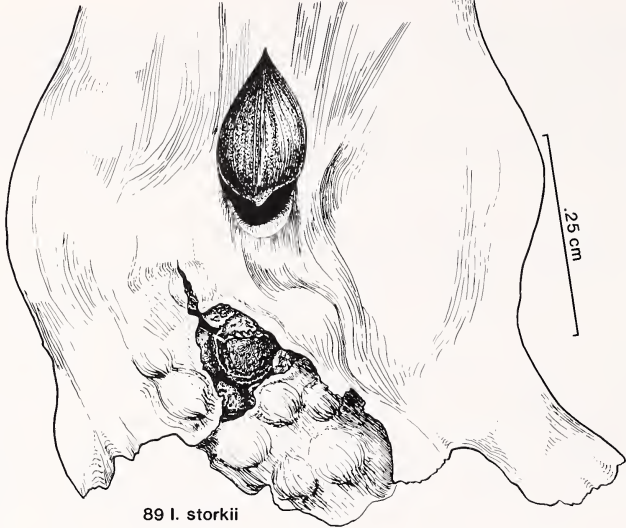
Equisetum elongatum var. *dolosum* Milde, Ann. Mus. Bot. Lugduno-Batavum 1:245. 1864. TYPE: Copiapó, Pcia. Atacama, Chile, *Philippi Pl. Chil. ed. Hohenacker 701* (B not seen).

Equisetum bolivianum Gand. Bull. Soc. Bot. France 66:304. 1920. TYPE: Yungas, Bolivia, *Bang* in 1901 (LY? not seen; isotype US).

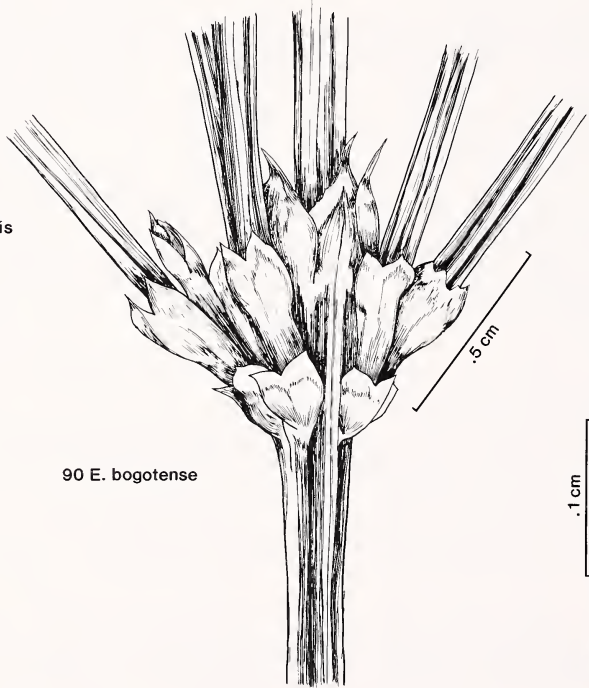
Equisetum philippii Gand. Bull. Soc. Bot. France 66:304. 1920, as “*phillipi*.” TYPE: Chile, *Philippi* (LY? not seen).



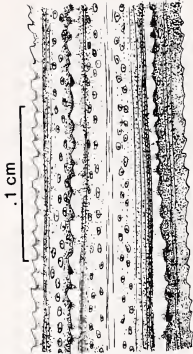
88 *I. panamensis*



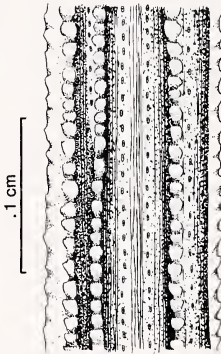
89 *I. storkii*



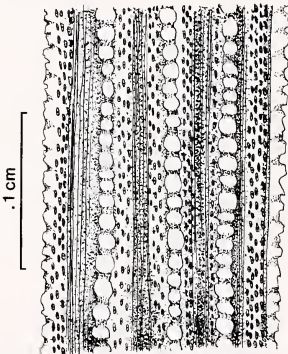
90 *E. bogotense*



93 *E. schaffneri*



92 *E. myriochaetum*



91 *E. giganteum*

Equisetum giganteum var. *digitaliferum* Pastore, Physis (Buenos Aires) 15:249. 1939. TYPE: Estancia Grande, S. Luis, Argentina, *Pastore* 94 (SI not seen).

TYPE: Plate 125, f. 2 of Plumier's "Plantarum Americanum Fasciculus Quintus," which is presumably based on a specimen collected by Plumier on Hispaniola. The plate is clearly drawn from a specimen of *E. giganteum*, and the reference on p. 115 to *E. fluviatile* L. is a misidentification on Plumier's part.

Plants terrestrial, at 600–1700 m elevation, on river banks and in wet places, from the Río Reventazón valley and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Cuba, Jamaica, Hispaniola, Mexico to El Salvador, Nicaragua, and South America except for the Guianas.

92. *Equisetum myriochaetum* Schlechtend. & Cham. *Linnaea* 5:623. 1830.

Equisetum myriochaetum var. *densum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 11:355. 1861. TYPE: Mexico, *Schaffner* (B not seen).

Equisetum myriochaetum var. *laxum* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 11:355. 1861. TYPE: Mexico, *Schaffner* (B not seen).

Equisetum mexicanum Milde, Verh. K. K. Zool.-Bot. Ges. Wien 12:1256. 1862. TYPE: Mexico, *Karwinski* (M not seen).

Equisetum elongatum var. *muelleri* Milde, Ann. Mus. Lugduno-Batavum 1:244. 1864. TYPE: Río Blanco, Eugenio, Mexico, Aug 1853, *Mueller* (L? not seen).

Equisetum myriochaetum f. *sprucei* Milde, Nov. Actorum Acad. Caes. Leop.-Carol. German. Nat. Cur. 32(2):499. 1867. TYPE: Baños, Río Pastaza, Pcia. Oriente, Ecuador *Spruce* 5370 (B not seen).

TYPE: Misantla, Edo. Veracruz, Mexico, *Schiede & Deppe* 833 (HAL? not seen; isotypes B not seen, LZ destroyed).

Plants terrestrial, at 200–1300 m elevation, on river banks and in wet places, from the northern and western slopes of the Cordillera de Talamanca. Also from Mexico to Honduras, Venezuela, Colombia, Ecuador, and Peru.

93. *Equisetum* × *schaffneri* Milde, Verh. K. K. Zool.-Bot. Ges. Wien 11:345. 1861.

Equisetum elongatum var. *annuliferum* Milde, Ann. Mus. Bot. Lugduno-Batavum 1:244. 1864. TYPE: Sierra de la Cruz, Mexico, Aug 1853, *Mueller* (L? not seen).

TYPE: Near Orizaba, Edo. Veracruz, Mexico, *Schaffner* 315 (B not seen).

Plants terrestrial, at 1100–1400 m elevation, in marshes and pastures, from the eastern end of the Meseta Central, around Cartago, and near Sta. María de Dota (Pcia. S. José). Also from Mexico to El Salvador, Venezuela, Colombia, Ecuador, and Peru.

This species is the hybrid between *E. giganteum* and *myriochaetum*.

FIGS. 88–93. *Isoetes* and *Equisetum*. FIG. 88. Leaf of *I. panamensis*, Woodson et al. 1685. FIG. 89. Leaf base of *I. storkii*, Lathrop 5560. FIG. 90. Main axis with branchlets of *E. bogotense*, Burger & Liesner 6792. FIG. 91. Portion of ultimate branch of *E. giganteum*, Mickel 3380. FIG. 92. Portion of ultimate branch of *E. myriochaetum*, Hauke & López 336(2b). FIG. 93. Portion of ultimate branch of *E. ×schaffneri*, Mickel 2412.

OPHIOGLOSSACEAE

Rhizomes subterranean, short and erect or rarely globular, glabrous, bearing fleshy roots lacking root hairs and 1–few fronds; fronds small, brittle, not circinate, partially dimorphic; stipes fleshy; laminae papyraceous to subcoriaceous, the sterile portion simple or forked to 3-pinnate, the usually erect fertile portion greenish or yellowish, unbranched and bearing 2 rows of sunken sporangia or branched several to many times and bearing 2 rows of short-stalked sporangia; sporangia globular, lacking an annulus, dehiscing transversely; spores trilete, numerous (more than 1,000 per sporangium).

1. Sterile portion of the laminae 2–3-pinnate, more or less deltate, with free veins; fertile portion of the laminae pinnately divided.

6. *Botrychium*

1. Sterile portion of the laminae simple or furcate, not deltate, with anastomosing veins; fertile portion(s) of the laminae simple.

7. *Ophioglossum*

6. BOTRYCHIUM Swartz

Plants terrestrial, in meadows and pastures or occasionally in forests; rhizomes subterranean, erect, short, bearing fleshy roots at the base and usually a single frond near the apex; buds of new fronds protected by the sheathing base of the old frond, the laminae when young folded, not circinate; fronds glabrous, partially dimorphic; sterile portion of the laminae expanded, 2–3-pinnate, spreading, yellow-green or bright green, the lamina subternate, the venation free; fertile portion of the laminae contracted, 1–3-pinnate, erect, yellow, bearing short-stalked, globular sporangia.

Widespread in temperate regions, with some tropical representatives; ca. 35 species. The species of *Botrychium* are subtle and their characters tend to be variable, all of which causes considerable difficulty in identifying them. The genus is being monographed by W. H. Wagner, Jr., who has combined herbarium and field studies to arrive at far better species concepts than were formerly known.

CLAUSEN, R. T. 1938. A monograph of the Ophioglossaceae. Mem. Torrey Bot. Club 19(2):1–177.

WAGNER, W. H., Jr. and F. S. WAGNER. 1983. Genus communities as a systematic tool in the study of New World Botrychium (Ophioglossaceae). Taxon 32:51–63.

1. Fertile portion of the laminae inserted several cm proximal to the base of the sterile portion; sterile portion papyraceous to subcoriaceous..3.

1. Fertile portion of the laminae inserted at the base of the sterile portion; sterile portion membranaceous to papyraceous..2.

2(1). Fertile portion of the laminae about as long as the sterile; ultimate segments acute, often with a few shallow incisions. Stipes 6–38 cm long; sterile laminae deltate, 6–28 cm long, 12–38 cm wide, 3-pinnate-pinnatifid, the ultimate segments oblong.

96. *B. virginianum* var. *mexicanum*

2(1). Fertile portion of the laminae usually greatly exceeding the sterile; ultimate segments round, usually lacking incisions. Stipes 25–30 cm long; sterile laminae broadly deltate, 10–13 cm long, 12–14 cm wide, 2-pinnate-pinnatifid to 3-pinnate, the ultimate segments elliptic to obovate.

97. *B. virginianum* var. *virginianum*

3(2). Pinnae obtuse or round at the apex; basal basiscopic pinnule of the lateral pinnae 1–2 times longer than the basal acroscopic pinnule; segment margins irregularly serrate-lacinate.

95. *B. underwoodianum*

3(2). Pinnae acute at the apex; basal basiscopic pinnule of the basal pinnae 2–3 times longer than the basal acroscopic pinnule; segment margins entire to evenly crenate.

94. *B. decompositum*

94. *Botrychium decompositum* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:51, t. 1. 1842.

TYPE: Orizaba, Edo. Veracruz, Mexico, 5000–6000 ft, *Galeotti 6452* (BR not seen photo 5061).

Plants terrestrial, at 1200–2200 m elevation, from Volcán Barba and Las Cóncevas (Pcia. Cartago). Also from Louisiana, Mexico, Guatemala, and Honduras.

95. *Botrychium underwoodianum* Maxon, Bull. Torrey Bot. Club 32:222, t. 6. 1905.

Botrychium ternatum var. *daedaleum* Christ in Pitt. Prim. Fl. Costaric. 3(1):46. 1901. TYPE: Cerros de Velirla, Copey, Pcia. S. José, 2600–2700 m, *Tonduz 11864* (BR or P not seen; isotype CR not seen photo US).

TYPE: Jamaica, *Jenman* in 1874–1879 (NY not seen; isotype US).

Plants terrestrial, at 2200–3500 m elevation, in pastures, from La Palma de S. Ramón, the Cordillera Central, the Fila de Cedral, and around Sta. María de Dota (Pcia. S. José). Also from Jamaica, Hispaniola, Guatemala, Honduras, Venezuela, and Colombia.

96. *Botrychium virginianum* var. *mexicanum* Hook. & Grev. Bot. Misc. 3:223. 1833.

Osmunda cicutaria Sav. ex Poir. in Lam. Encyc. Méth. 4:650. 1798. TYPE: Based on plate 159 of Plumier's "Traité...", which is based on specimens collected by Plumier on Hispaniola.

Botrychium brachystachys Kunze, Linnaea 18:305. 1844. TYPE: Mexico, *Leibold 35* (LZ destroyed).

Botrychium dichroum Underw. Bull. Torrey Bot. Club 30:45. 1903. TYPE: Morce's Gap, Jamaica, 1500 m, *Clute 96* (NY not seen; isotype US).

Botrychium virginianum var. *meridionale* Butters, Rhodora 19:213. 1917. TYPE: Edo. Chiapas, Mexico, *Ghiesbreght 252* (GH not seen).

SYNTYPES: Jalapa, Edo. Veracruz, Mexico, *Chamisso* (K not seen); and Rigla, Mexico, *Veitch* (K not seen).

Plants terrestrial, at 1000–2700 m elevation, in forests, from the Cordillera Central, Cerro Piedra Blanca (Pcia. S. José), Cerro Carpintera, the northern portion of the Cordillera de Talamanca, and around Boquete. Also from Cuba, Jamaica, Hispaniola, Mexico, Guatemala, El Salvador, Colombia to Bolivia, and Brazil.

According to W. H. Wagner, Jr. (pers. comm.), intermediates with var. *virginianum* are known.

97. *Botrychium virginianum* (L.) Swartz, J. Bot. (Schrader) 1800(2):111. 1801, var. *virginianum*.

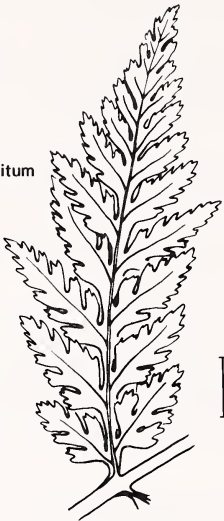
Osmunda virginiana L. Sp. Pl. 2:1064. 1753. TYPE: North America, *Kalm* (LINN 1244.3 not seen microfiche S. I. Library).

Botrychium gracile Pursh, Fl. Amer. Sept. 2:656. 1814. TYPE: Virginia, *Pursh* (PH? not seen).

Botrychium virginianum var. *intermedium* Butters, Rhodora 19:210. 1917. TYPE: Canton, New York, *Phelps 47* (GH not seen), synonymized by Clausen (Mem. Torrey Bot. Club. 19(2):98. 1938).



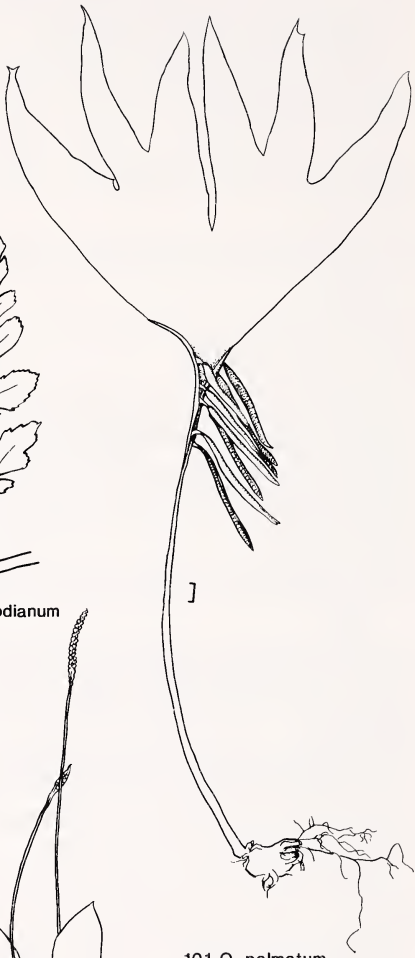
94 *B. decompositum*



96 *B. virginianum*
var. *mexicanum*



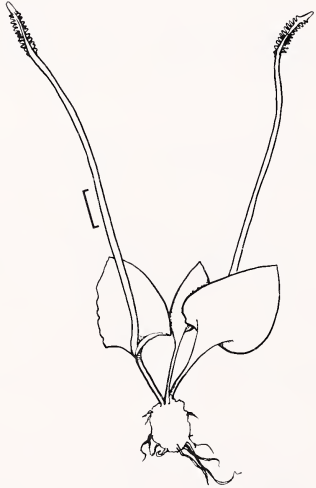
95 *B. underwoodianum*



101 *O. palmatum*



102 *O. reticulatum*



98 *O. crotalophoroides*



99 *O. ellipticum*



100 *O. nudicaule*

Botrychium virginianum var. *occidentale* Butters, Rhodora 19:213. 1917. TYPE: South end of Lake Pend d'Oreille, Idaho, Sandberg *et al.* 762 (GH not seen; isotype US).

Plants terrestrial, at 1600–2400 m elevation, in forests and open areas, from south of Sta. María de Dota (Pcia. S. José), and Boquete and the Volcán de Chiriquí. Also from Canada, the United States, Mexico, and Guatemala.

7. OPHIOGLOSSUM L.

Plants terrestrial, in meadows and pastures (subg. *Ophioglossum*) or epiphytic on tree trunks in wet forests (subg. *Cheiroglossa*); rhizomes subterranean, erect, short, rarely globose, bearing fleshy roots at the base and 1–few fronds near the apex; fronds glabrous, not circinate, partially dimorphic; sterile portion of the laminae expanded, simple (furcate in subg. *Cheiroglossa*), pale to dark green, the venation irregularly areolate, sometimes with finer veins dividing the major areolae into yet smaller ones; fertile portion of the laminae (1 in subg. *Ophioglossum*, several in subg. *Cheiroglossa*) contracted, simple, erect (in subg. *Ophioglossum*) or pendulous (in subg. *Cheiroglossa*), bearing 2 rows of globular sporangia partially embedded in the tissue.

Widespread in temperate and tropical regions, but nowhere common; ca. 25 species. These reduced plants have few characters, and they are variable. The sterile, expanded portion of the laminae is peculiar in lacking a midrib. Species delimitation in *Ophioglossum* may be difficult; size is not a reliable character, and venation is sometimes influenced by size.

CLAUSEN, R. T. 1938. A monograph of the Ophioglossaceae. Mem. Torrey Bot. Club 19(2):1–177.

1. Plants 25–60 cm long; sterile portion of the laminae palmately lobed, usually with several elongate, short-stalked fertile portions along the lateral edges of the sterile portion and the stipe apex; plants epiphytic (subg. *Cheiroglossa*).

101. *O. palmatum*

1. Plants less than 15(30) cm long; sterile portion of the laminae entire and unlobed, with 1 elongate, long-stalked fertile portion inserted on the common stalk at or just proximal to the sterile portion; plants terrestrial (subg. *Ophioglossum*)..2.

2(1). Rhizomes erratically spherical, ca. 3–5 mm in diam.

98. *O. crotalophoroides*

2(1). Rhizomes cylindrical or ovoid, usually less than 3 mm in diam...3.

3(2). Primary areolae of the sterile portion of the laminae with included secondary areolae. Laminae 4–6 cm long, 1–2 cm wide.

99. *O. ellipticum*

3(2). Primary areolae of the sterile portion of the laminae with occasional included veinlets, but lacking secondary areolae..4.

4(3). Sterile portion of the laminae 2–6 cm long, (2)2.5–4.5 cm wide; rhizomes cylindrical.

102. *O. reticulatum*

4(3). Sterile portion of the laminae 0.4–1.5 cm long, 0.3–0.8 cm wide; rhizomes ovoid.

100. *O. nudicaule*

FIGS. 94–102. *Botrychium* and *Ophioglossum*. FIG. 94. Median pinna of *B. decompositum*, Wagner 81001. FIG. 95. Median pinna of *B. underwoodianum*, Tonduz 11864. FIG. 96. Median pinna of *B. virginianum* var. *mexicanum*, Standley 34153. FIG. 98. Plant of *O. crotalophoroides*, Skutch 604, Guatemala. FIG. 99. Plant of *O. ellipticum*, Williams & Molina 14153, Honduras. FIG. 100. Plant of *O. nudicaule*, Pringle 7086, Mexico. FIG. 101. Plant of *O. palmatum*, Skutch 3427. FIG. 102. Plant of *O. reticulatum*, Tonduz 8788.

98. *Ophioglossum crotalophorides* Walter, Fl. Carol. 256. 1788.

Ophioglossum bulbosum Michx. Fl. Bor.-Amer. 2:276. 1803. TYPE: "In sabulosis Carolinae inferioris," Michaux (P not seen Morton photo 3373).

Ophioglossum stipatum Colla, Mem. Reale Acad. Sci. Torino 39:52, t. 75, f. 1. 1836. TYPE LOCALITY: Chile.

TYPE: South Carolina, *Walter* (not seen).

Plants terrestrial, often among mosses, at 3300–3400 m elevation, in exposed areas and pastures, in the Flora area known only from the Valle de los Conejos, near El Cañón, Pcia. Cartago (*Gómez & Burger, Gómez 3411*, both CR). Also from the southern United States, Hispaniola, Mexico to Honduras, Venezuela, Colombia, Peru, Bolivia, Uruguay, Argentina, and Chile.

This species is unique among New World *Ophioglossums* for its globular rhizomes, which were studied in detail by Mesler (*Amer. Fern J.* 63:28–33. 1973).

99. *Ophioglossum ellipticum* Hook. & Grev. Ic. Fil. 1:t. 40A. 1827.

Ophioglossum vulgatum var. *surinamense* Luer. J. Mus. Godeffroy 3:246, f. 119, 120, 131, 132. 1875. TYPE: Surinam, *Weigelt* (B? not seen).

TYPE: Demarara, Guyana, *Parker* (K not seen).

Plants terrestrial, at 0–900(2100) m elevation, in savannas, meadows, and open ground, from the Cordillera Central, the Cordillera de Talamanca near Copey (Pcia. S. José), the basin of the Río General, and various localities in Pcia. Panama. Also from Mexico to Honduras and the Guianas to Brazil.

According to Wagner, Allen, and Landry (*Castanea* 49:99–110. 1984), this species may be a large form of *O. nudicaule*, at least as to material from the southeastern United States. *Ophioglossum usterianum* Christ in Usteri (Fl. São Paulo 137. 1911) and *O. valdivianum* Phil. (Linnaea 33:306. 1865) may be synonyms of this species; I have seen neither types nor other specimens of either.

100. *Ophioglossum nudicaule* L. fil. Suppl. Pl. Syst. Veg., ed 13. 443. 1782.

Ophioglossum ypanemense Mart. Icon. Pl. Crypt. Bras. 39, 130, t. 73, f. 1. 1834. TYPE: Ypanema, Est. S. Paulo, Brazil, 1700 ft, *Martius* in 1818 (BR not seen; isotype M not seen photo 7769).

Ophioglossum macrorhizum Kunze, Farrnkräuter 1:57, t. 29, f. 1. 1840. TYPE: French Guiana, *Leprieur* (LZ destroyed?).

Ophioglossum melipillense Remy in Gay, Fl. Fís. Polit. Chile, Bot. 6:542. 1853. TYPE LOCALITY: Melipilla, Chile.

Ophioglossum spruceanum Fée, Crypt. Vasc. Brésil 1:218, t. 52, f. 3. 1869. TYPE: Near S. Gabriel de Cachoeira, Rio Negro, Est. Amazonas, Brazil, *Spruce 2041* (RB not seen; isotypes BM not seen photo 7770, US).

Ophioglossum tenerum Mett. ex Prantl, Ber. Deutsch. Bot. Ges. 1:352. 1883. TYPE LOCALITY: Georgia, United States.

Ophioglossum nudicaule var. *minus* Clausen, Mem. Torrey Bot. Club 19(2):148, f. 29. 1938. TYPE: Vicinity of Ft. Myers, Lee County, Florida, *Standley 354* (US; isotypes GH, NY).

Ophioglossum nudicaule var. *vulcanicum* Clausen, Mem. Torrey Bot. Club 19(2):150, f. 31, 32. 1938. TYPE: Llanos del Volcán, Pcia. Chiriquí, Panama, *Martin 2798* (US).

Ophioglossum dendroneuron E. St. John in Small, Ferns S.E. States 364, fig. 1938. TYPE: Crystal River, Lecanto, Citrus Co., Florida, *E. St. John 568* (NY not seen).

TYPE: Cape of Good Hope, South Africa, *Thunberg* (UPS not seen microfiche S. I. Library).

Plants terrestrial, at 0–1600 m elevation, from Tarbaca (Pcia. S. José), Llanos del Volcán (Pcia. Chiriquí), near Gatun (Canal Zone), and east of Pacora and S.

José Island (both Pcia. Panama). Also from the southeastern United States, Cuba, Hispaniola, Mexico, Guatemala, Honduras, Nicaragua, Venezuela, Colombia, Bolivia, Guyana, French Guiana, Brazil, and Argentina.

101. *Ophioglossum palmatum* L. Sp. Pl. 2:1063. 1753.

TYPE: Plate 163 of Plumier's "Traité...", which is based on a specimen collected by Plumier on Hispaniola.

Plants epiphytic, at 1400–2200 m elevation, in forests, from the vicinity of S. Ramón, the Cordillera Central, Orosi (Pcia. Cartago), and Cerro Tacarcuna. Also from Florida, the West Indies, Mexico, Honduras, Nicaragua, Venezuela, Colombia to Bolivia and Brazil, Guyana, and Surinam.

102. *Ophioglossum reticulatum* L. Sp. Pl. 2:1063. 1753.

Ophioglossum peruvianum K. Presl, Suppl. Tent. Pterid. 52 (postpr. 313). 1845. SYNTYPES: Pampayaco, Depto. Huánuco, Peru, *Poeppig* 1150 (PRC not seen); and Sión Mission, Depto. S. Martín, Peru, *Poeppig* in 1830 (PRC not seen).

TYPE: Plate 10, f. 4, of Petiver's "Pterigraephia Americana," which is a transposed re-drawing of a portion of t. 164 of Plumier's "Traité...", which is in turn based on a specimen collected by Plumier on Hispaniola.

Plants terrestrial, at 700–2100 m elevation, in pastures, on roadbanks, and on riverbanks, from the Cordillera de Tilarán, the Cordillera Central, Tarbaca (Pcia. S. José), Cerro Tablazo, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from the Antilles, Mexico to Honduras, Nicaragua, Venezuela to Bolivia, Brazil, the Guianas, and Argentina.

MARATTIACEAE

Rhizomes fleshy, creeping or erect and often massive, bearing deciduous or persistent scales; fronds monomorphic or slightly dimorphic in some species, brittle; stipes articulate to the rhizome, enlarged at the base and these bearing ala-like outgrowths; laminae simple to 3(4)-pinnate, sometimes sparsely scaly or hairy, especially the axes fleshy and swollen at the point of insertion of the opposite pinnae; rachis (and costae if present) commonly alate; synangia tan to brown, borne on the abaxial surface of the laminae, the sporangia fused in 2 rows, lacking an annulus, dehiscent by a pore or slit; spores monolete or trilete, numerous (more than 1,000 per sporangium).

1. Fronds usually more than 1 m long, 2–3(4)-pinnate, monomorphic; synangia short, not covering the abaxial surface of the segment, dehiscent by slits.

8. *Marattia*

1. Fronds usually less than 1 m long, simple to pinnate, slightly dimorphic; synangia long, nearly covering the abaxial surface of the frond or pinna, dehiscent by pores.

9. *Danaea*

8. MARATTIA Swartz

Plants terrestrial, usually in forests, often in very dense shade; rhizomes erect, short, massive, scaly, the scales thin, tan; fronds large; stipes fleshy, stipulate, stramineous to brown at the base, scaly at the base; laminae 2–3(4)-pinnate, especially the axes fleshy; pinnae alternate, the costae exalate, sparsely scaly, slightly inflated and blackish at the base; costules alate, the alae narrowly oblanceolate between the pinnules or segments; ultimate segments often oblong or ovate, usually glabrous, with free, unbranched or forked veins; sporangia in 2 rows, fused into sessile or short-stalked, subterminal, long-oval, brownish synangia dehiscent by a longitudinal slit.

Widespread but infrequent in the tropics, especially in the Old World; ca. 60 species.

UNDERWOOD, L. M. 1909. Marattiaceae. North Amer. Fl. 16(1):15–23.

1. Costules not spinulose on the adaxial surface; synangia sessile or nearly so; brown hairs and narrow scales present on the abaxial surface of the veins..3.

1. Costules sparingly spinulose on the adaxial surface; synangia distinctly stalked; brown hairs and narrow scales absent from the abaxial surface of the veins..2.

2(1). Sterile ultimate (tertiary) segments crenate to lobed; lobes of pinnatifid pinnules 0.2–0.8 cm long.

105. *M. laevis*

2(1). Sterile ultimate (tertiary) segments entire to slightly crenate; lobes of pinnatifid pinnules 0.4–1 cm long.

106. *M. pittieri*

3(1). Laminae 2-pinnate, the acute-acuminate pinnae 6–30 cm long, 1.5–2 cm wide.

105a. *M. laxa*

3(1). Laminae predominantly 3-pinnate (smaller pinnae 2-pinnate), the pinnae or pinnules 1.2–6 cm long, 0.6–1.5(2) cm wide..4.

4(3). Ultimate (tertiary) segments round or subacute at the apex, 8–20(25) mm long, 4–10 mm wide. Laminae predominantly 3-pinnate.

103. *M. excavata*

103. *Marattia excavata* Underw. North Amer. Fl. 16(1):22. 1909.

TYPE: Coliblanco, Pcia. Cartago, ca. 2000 m, *Maxon* 272 (NY; isotype US).

Plants terrestrial, at 1200–1900(2700) m elevation, in wet forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and the Fila Costeña near S. Vito. Also from Mexico to Nicaragua.

This species and *M. interposita* are not markedly distinct anywhere in their largely coextensive ranges. Detailed field and laboratory study may show that this species should be no more than a variety of *M. interposita*.

104. *Marattia interposita* Christ, Bull. Herb. Boissier II, 6:285. 1906.

Marattia chiricana Maxon, Contr. U. S. Natl. Herb. 17:421. 1914. TYPE: Cuesta de Las Palmas, S slope of Cerro de la Horqueta, Pcia. Chiriquí, 1700–2100 m, *Maxon* 5525 (US; isotypes GH, US).

TYPE: Navarro, Pcia. Cartago, *Wercklé* (P not seen fragm NY; isotype US).

Plants terrestrial, at (1100)1400–2000 m elevation, in dense, damp to wet forests, from the Cordillera de Tilarán, the Cordillera Central, Cerro Carpintera, and Cerro de la Horqueta (Pcia. Chiriquí). Also from Guatemala to Nicaragua.

For a comment on this species, see *M. excavata*.

105. *Marattia laevis* J. E. Smith, Pl. Icon. Ined. 2:t. 47. 1790.

Marattia kaulfussii J. Smith in Hook. Gen. Fil. ad t. 26. 1839. TYPE: Possibly Brazil, collector unknown (presumably LZ destroyed), according to Kaulfuss (Enum. Fil. 32. 1824), or even Brazil, *A. Cunningham* in 1816 (BM not seen photo 7750).

TYPE: Hispaniola, *Thierry-Th.* 90 (LINN not seen), examined by J. M. Camus (in litt. ad R. G. Stolze 27 June 1985).

Plants terrestrial, at 1500–2000 m elevation, in wet forests, in the Flora area known only from the flanks of Volcán Barba and south of Tapantí. Also from Cuba, Hispaniola, Puerto Rico, Venezuela to Bolivia, and Brazil.

105a. *Marattia laxa* Kunze, Linnaea 18:306. 1845.

TYPE: “In humidis region. temper.,” Mexico, *Leibold* 62 (LZ destroyed; isotype Hb. Roemer not seen).

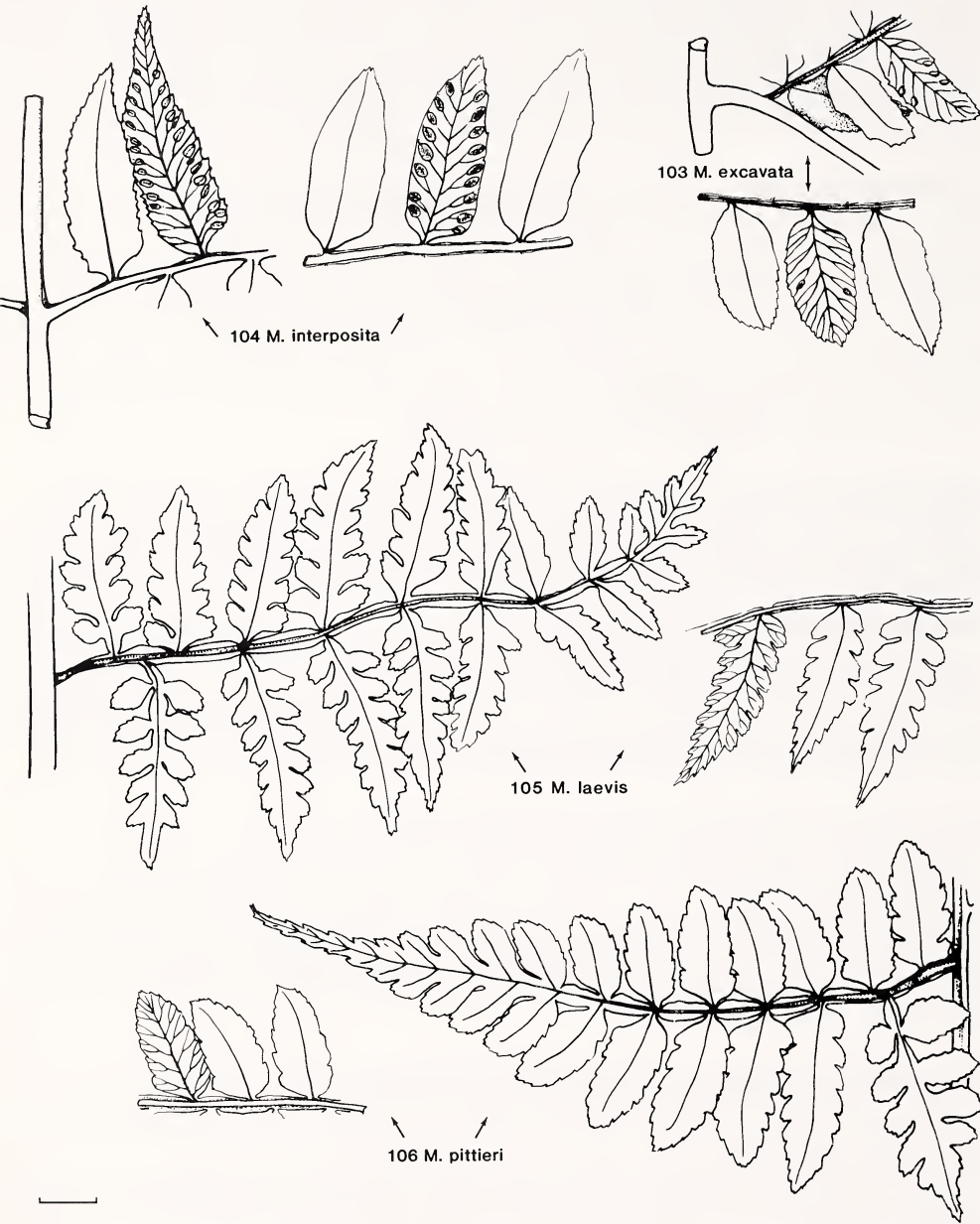
Plants terrestrial, at ca. 1500 m elevation, in the Flora area known only from near Monteverde, Pcia. Puntarenas (*Burger & Antonio* 10848, F fragm US; *Mickel* 3582, US). Also from Mexico.

106. *Marattia pittieri* Maxon, Contr. U. S. Natl. Herb. 17:421. 1914.

TYPE: Holcomb’s trail above Boquete, Pcia. Chiriquí, 1625 m, *Maxon* 5704 (US fragm NY; isotype US).

Plants terrestrial, at 1600–1700 m elevation, in wet forests, known only from the type collection.

This species probably will prove to be synonymous with *M. laevis*, from which it differs by the characters given in the key. The other differentiating characters listed by Maxon also characterize large specimens of *M. laevis* that have been collected in recent years in Colombia.



9. DANAEA J. E. Smith

Plants terrestrial, in the deepest shade of dense forests; rhizomes short-creeping or ascending, bearing thick, fleshy roots; fronds small to medium-sized, subdimorphic, the fertile ones larger but with the pinnae somewhat contracted; stipes fleshy, stipulate, nodose, stramineous to pale brown, often scaly, the scales small, thin, dark brown; laminae pinnate or rarely simple, firm, rather fleshy; rachises similar to the stipes; lateral pinnae mostly elliptic-oblong, opposite, inserted on the rachises at the swollen nodes, the veins paired or forked near the costae, closely spaced, bearing nearly throughout elongate, brownish synangia dehiscent by 2 rows of pores.

Solely tropical America; ca. 30 species.

UNDERWOOD, L. M. 1909. Marattiaceae. North Amer. Fl. 16(1):15–23.

1. Sterile fronds simple or with 1 pair of minute basal lobes or pinnae. Sterile fronds with stipes 8–10 cm long, laminae ca. 14 cm long, 3.5 cm wide, cuneate at the base, acuminate and short-serrate at the apex; fertile fronds with stipes 15 cm long, laminae ca. 15 cm long, 0.9 cm wide.

107. *D. carillensis*

1. Sterile fronds pinnate, with at least several pairs of lateral pinnae..2.

2(1). Sterile pinnae less than 2.5 cm wide..4.

2(1). Sterile pinnae (2.5)3 cm or more wide..3.

3(2). Sterile pinnae 7–11(15), elliptic, mostly obtuse with an acuminate apex; stipes with 1–5 nodes. Sterile laminae broadly lanceolate, the pinnae up to 15 cm long, 4(5) cm wide, linear-elliptic to oblanceolate, acute to almost round at the base, acuminate-cuspidate at the apex.

110. *D. elliptica*

3(2). Sterile pinnae 15 or more, nearly parallel-sided, mostly acute with a caudate apex; stipes usually without nodes. Sterile laminae lanceate to oblong, the pinnae up to 27(32) cm long, 4.5(5) cm wide, cuneate to almost round at the base, acuminate-cuspidate at the apex.

112. *D. nodosa*

4(2). Terminal pinna present, the laminae odd-pinnate; laminae lacking an apical bud..6.

4(2). Terminal pinna absent or deciduous, the laminae even-pinnate; laminae with an apical bud..5.

5(4). Laminae crisped, the margins erose. Sterile fronds with stipes 4–9 cm long with usually 1 node, the laminae ovate-lanceolate, 10–21 cm long, 4–9 cm wide.

108. *D. crispa*

5(4). Laminae not crisped, the margins entire to serrate. Sterile fronds with stipes 4–15 cm long with 1 or 2 nodes, the laminae linear or linear-lanceolate, 10–30 cm long, 4–10(15) cm wide.

115. *D. wendlandii*

6(4). Terminal pinna 2–3 times longer than the longest lateral pinnae. Sterile fronds with stipes 9 cm long with 2 or 3 nodes, the laminae lanceolate, 20 cm long, 12 cm wide.

113. *D. plicata*

6(4). Terminal pinnae shorter than the longest lateral pinnae..7.

7(6). Largest sterile pinnae 4–5.5 cm long, 0.8–1.2 cm wide, parallel-sided, distinctly falcate at the apex. Sterile fronds with stipes 15–20 cm long with 3 or 4 nodes, the laminae linear, 25–30 cm long, 5.5–8 cm wide.

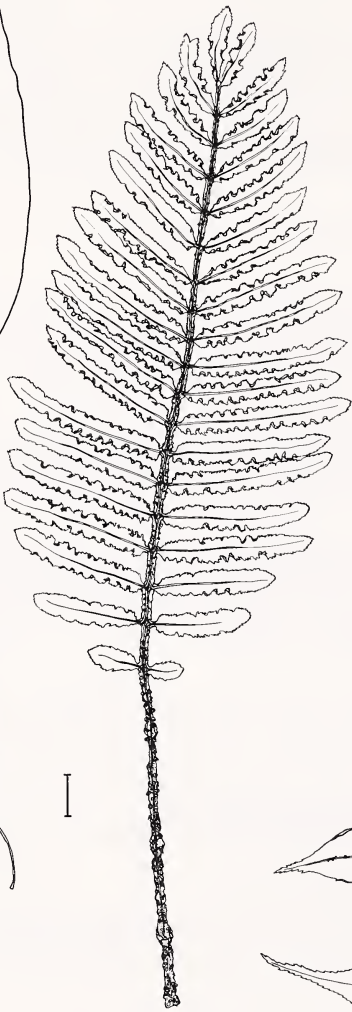
114. *D. serrulata*

7(6). Largest sterile pinnae (4)7–18 cm long, 1.2–2.5 cm wide, only the larger ones parallel-sided, not or slightly falcate..8.

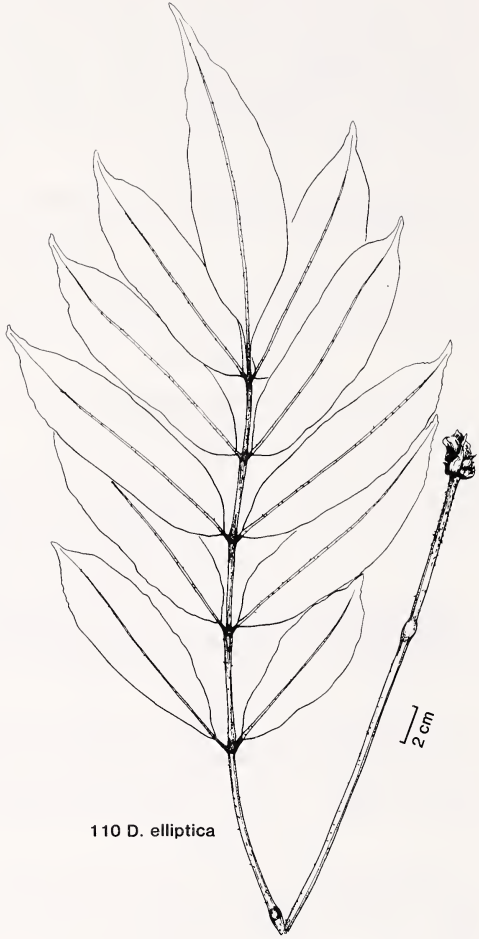
FIGS. 103–106. *Marattia*. FIG. 103. Tertiary segments of *M. excavata*, Valerio 119. FIG. 104. Tertiary segments of *M. interposita*, Killip 5145. FIG. 105. Tertiary segments of *M. laevis*, Pittier 10031, Venezuela. FIG. 106. Tertiary segments of *M. pittieri*, Maxon 5704.



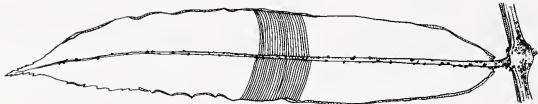
107 *D. carillensis*



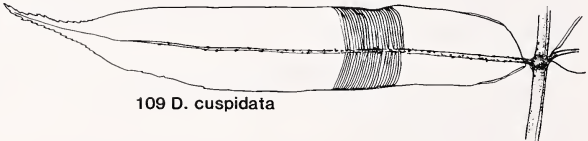
108 *D. crispa*



110 *D. elliptica*



111 *D. moritziana*



109 *D. cuspidata*

8(7). Sterile pinnae inequilateral and obtuse to round at the base, the veins much darker than the lamina tissue, usually paired at origin. Sterile fronds with stipes 11–45 cm long, with 0–3 nodes; sterile laminae linear-lanceate, not much tapered at the base, 15–40(55) cm long, (7)10–24 cm wide.

109. *D. cuspidata*

8(7). Sterile pinnae inequilateral and acute to rarely round at the base, the veins not or only slightly darker than the lamina tissue, usually not paired at origin. Sterile fronds with stipes 15–31 cm long, with 1 or 2 nodes; sterile laminae usually linear-lanceolate, tapered at the base, 15–60 cm long, (5)10–30 cm wide.

111. *D. moritziana*

107. *Danaea carillensis* Christ, Bull. Soc. Bot. Genève II, 1:234. 1909.

TYPE: Carrillo, Pcia. S. José, 400 m, *Wercklé* 365 (P not seen).

Plants terrestrial, at 400–1400 m elevation, in wet forests, from 18 km north of S. Ramón and Volcán Cacho Negro (both Pcia. Alajuela), Virgen del Socorro (Pcia. Heredia), and Carrillo (Pcia. S. José).

108. *Danaea crispa* Endres in Reichenb. f. Bot. Zeitung (Berlin) 30:489. 1872.

TYPE: Costa Rica, *Endres* (B? not seen).

Plants terrestrial, at 300–1200 m elevation, mostly in very dark forests, from near S. Ramón, the Cordillera Central, the Cordillera de Talamanca (Pcia. Chiriquí), northwest of Sta Fé, and El Cupé (Pcia. Coclé).

109. *Danaea cuspidata* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:307 (repr. 155). 1849.

Danaea pterorachis Christ, Bull. Soc. Bot. Genève II, 1:235. 1909. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen).

Danaea muenchii Christ in Rosenst. Repert. Spec. Nov. Regni Veg. 22:23. 1925. TYPE: S. Pablo, Edo. Chiapas, Mexico, *Muench* 159 (probably P not seen; isotypes DS not seen, US).

TYPE: Chinantla, between Lobani and Petlapa, Edo. Oaxaca, Mexico, 2500 ft, *Liebmenn* (C not seen).

Plants terrestrial, at (600)1000–2300 m elevation, in forests usually near streams, from the Cordillera Central, Cerro Tablazo, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito, the Peninsula de Osa, the valley of the Río Dos Bocas (Pcia. Veraguas), Cerro Pilón (Pcia. Coclé), near the Altos de Pacora (Pcia. Panama), and above Cana. Also from Mexico and Guatemala.

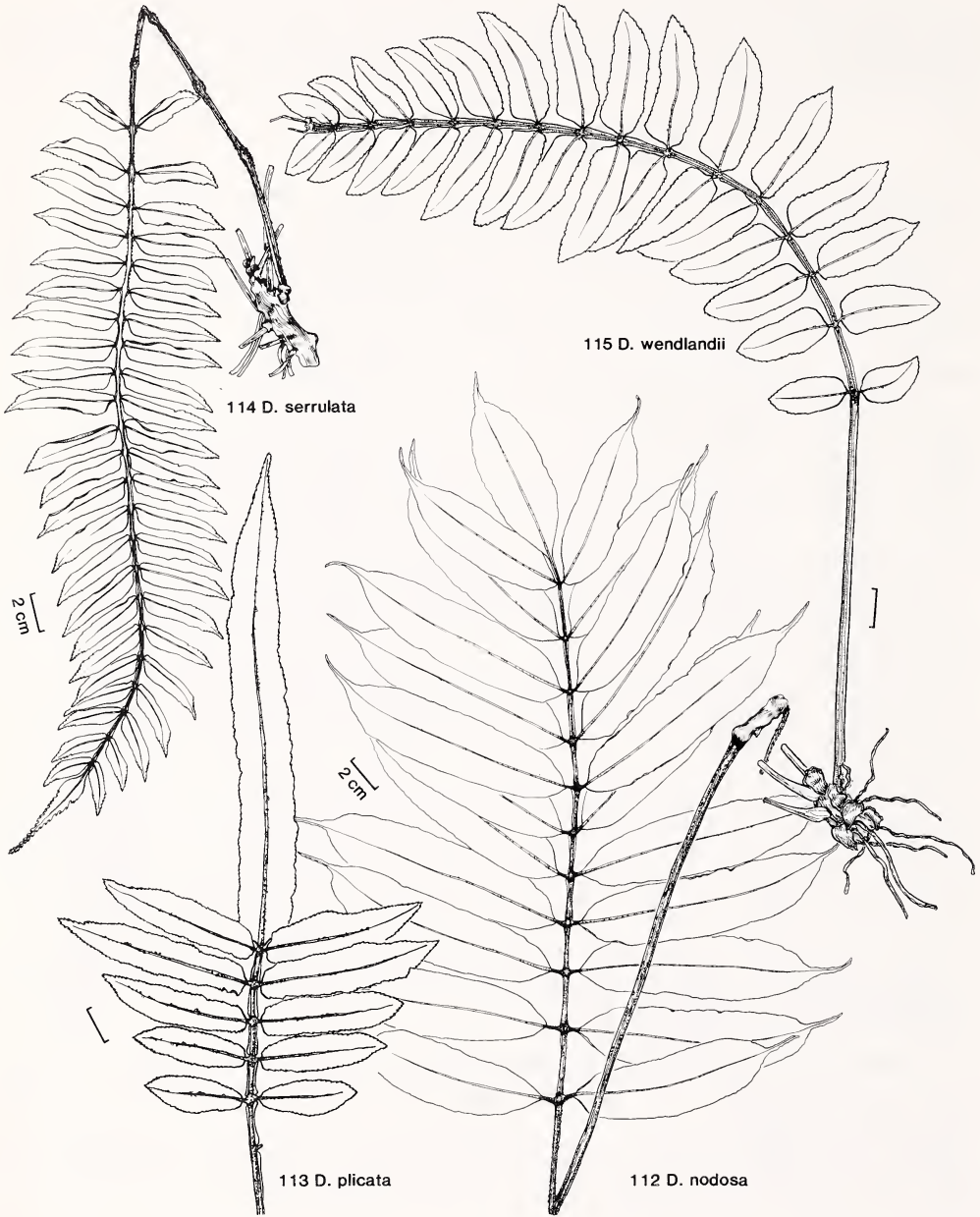
This species may prove to be conspecific with *D. moritziana*, which is an earlier name. Both species have the minute scales on the abaxial lamina surface noted by Stolze (*Fieldiana*, Bot. 39:16. 1976).

110. *Danaea elliptica* J. E. Smith in Rees, Cycl. 11: *Danaea* no. 2. 1808.

Danaea geniculata Raddi, Opusc. Sci. 3:281. 1819. TYPE: Mandiocca, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Danaea media Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:306 (repr. 154). 1849. TYPE: Near Hacienda de Jovo, Edo. Veracruz, Mexico, *Liebmenn* (C not seen photos 5578, 5625, 5625a).

FIGS. 107–111. *Danaea*. FIG. 107. Plant of *D. carillensis*, Brade & Brade 303. FIG. 108. Frond of *D. crispa*, Brade & Brade 328. FIG. 109. Sterile median pinna of *D. cuspidata*, Scamman 6992. FIG. 110. Frond of *D. elliptica*, Stern et al. 681. FIG. 111. Sterile median pinna of *D. moritziana*, Lellinger & de la Sota 247.



Danaea oligosora Fourn. ex Baker, Ann. Bot. (London) 5:499. 1891. TYPE: Guadeloupe, Fournier (P? not seen).

Danaea polymorpha Leprieur ex Baker, Ann. Bot. (London) 5:499. 1891. SYNTYPES: Guadeloupe, Mazé (P? not seen); and Grenada, Sherring (K not seen).

Danaea grandifolia Underw. North Amer. Fl. 16(1):18. 1909. TYPE: Valparaíso, Sta. Marta, Depto. Magdalena, Colombia, Smith 992 (NY not seen).

Danaea elliptica var. *crispula* Rosenst. Repert. Spec. Nov. Regni Veg. 6:310. 1909. TYPE: Río Mayo, near Tarapoto, Depto. S. Martín, Spruce 4770 (S not seen; isotypes L not seen photo 839a, US).

LECTOTYPE: Mt. Diablo, Jamaica, *Sloane Herb.* 1:85 (BM not seen), chosen by Proctor (Fl. Less. Antill. 2:48. 1977).

Plants terrestrial, at 0–600(1200) m elevation, in forests, from Puerto Viejo (Pcia. Heredia), Carrillo (Pcia. S. José), Pejivalle (Pcia. Cartago), Barro Colorado Island (Canal Zone), S. José Island and Juan Díaz (Pcia. Panama), the vicinity of Cana, and Cupica (Depto. Chocó). Also from the Antilles, Trinidad, Mexico to Honduras, Nicaragua, Venezuela, Colombia, Peru, Bolivia, the Guianas, and Brazil.

111. *Danaea moritziana* K. Presl, Suppl. Tent. Pterid. 35. 1846.

TYPE: Colonia Tovar, Edo. Aragua, Venezuela, Moritz 257 (PRC? not seen; isotypes B not seen fragm NY, L not seen photo 842).

Plants terrestrial, at 700–1800 m elevation, in forests, from below the Alturas de Nique (Pcia. Darién) and Alto del Buey and the Ciudad Bolívar–Quibdó road (Depto. Chocó). Also from Venezuela, Colombia, Peru, and Bolivia.

This species may prove to be conspecific with *D. cuspidata* and is the earlier name, or the Colombian coastal material alone may be *D. cuspidata*.

112. *Danaea nodosa* (L.) J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:420, t. 9, f. 11. 1793.

Acrostichum nodosum L. Sp. Pl. 2:1070. 1753. LECTOTYPE: Plate 108 of Plumier's "Traité...", which is based on a specimen collected by Plumier near Port-de-Paix, Hispaniola, chosen by Underwood (Bull. Torrey Bot. Club 29:671. 1902).

Danaea longifolia Desv. Ges. Naturf. Freunde Berlin Mag. 5:307. 1811. TYPE: Antilles, collector unknown (P-Hb. Desv. not seen), synonymized by Weatherby (Contr. Gray Herb. 94:23. 1936).

Danaea angustifolia K. Presl, Suppl. Tent. Pterid. 35. 1846. TYPE: Antilles, Bertero (P not seen).

Danaea elata Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:306 (repr. 154). 1849. TYPE: Hacienda de Jovo, Edo. Veracruz, Mexico, 1500 ft, Liebm. Pl. Mex. 2199, Fl. Mex. 848 (C not seen), synonymized by A. R. Smith (Fl. Chiapas 2:89. 1981).

Plants terrestrial, at 0–1700 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca, the Atlantic lowlands of Costa Rica and Panama, and scattered localities in Pcia. Darién and the northern half of the Chocó. Also from the Antilles, Trinidad, Mexico to Honduras, Nicaragua, Venezuela to Peru, Surinam, and Brazil.

113. *Danaea plicata* Christ, Repert. Spec. Nov. Regni Veg. 8:19. 1910.

TYPE: Carrillo, Pcia. S. José, 400 m, Brade & Brade 327 (P not seen).

FIGS. 112–115. *Danaea*. FIG. 112. Frond of *D. nodosa*, Mickel 3504. FIG. 113. Laminae of *D. plicata*, McAlpin 1291. FIG. 114. Plant of *D. serrulata*, Killip 35263. FIG. 115. Plant of *D. wendlandii*, Mickel 3526.

Plants terrestrial, at 400–600 m elevation, in dense, wet forests, known only from the type locality and from about 30 km above S. Ramón on the road to Los Angeles Norte, Pcia. Alajuela (*McAlpin 1291*, DUKE, US).

114. *Danaea serrulata* Baker, J. Bot. Brit. For. 19:208. 1881.

TYPE: Colombia, *Kalbreyer 1352* (K not seen).

Plants terrestrial, at 200–300 m elevation, in forests, in the Flora area known only from the Corcovada region, upper Río S. Juan, Depto. Chocó (*Killip 35263*, US).

This species may be conspecific with the earlier *D. humilis* Moore from Peru. Both species are small, odd-pinnate, with falcate pinnae that are strongly inequilateral at the base and somewhat serrate at the acute to acuminate apex. Juvenile specimens of *D. moritziana* resemble adult specimens of *D. serrulata*, but differ in having 15(18) or fewer, rather than more than 15(18), lateral pinna pairs and in tending to have the pinnae obtuse, rather than acute, at the apex.

115. *Danaea wendlandii* Reichenb. f. Bot. Zeitung (Berlin) 30:490. 1872.

TYPE: Piedragas[?], Costa Rica, *Wendland 744* (B not seen Alston photo).

Plants terrestrial, at 1800 m elevation, in forests, from above S. Ramón on the road to Los Angeles Norte (Pcia. Alajuela), the Atlantic coastal plain of Costa Rica, the Cordillera de Talamanca, Chagres (Pcia. Panama), between Cana and Cuasi (Pcia. Darién), and the northwestern part of the Depto. Chocó. Also from Nicaragua, Colombia, and Ecuador.

The stipes of this species are often alate and have but one node. The Jamaican *D. jenmanii* Underw. is related.

OSMUNDACEAE

Monotypic in the Flora area; see description of *Osmunda*.

10. OSMUNDA L.

Plants terrestrial, in swamps, roadside ditches, and open areas; rhizomes erect, stout, bearing fibrous roots; fronds medium-sized to large, caespitose, partially or fully dimorphic, the fertile fronds (or portions of fronds) longer than the sterile ones; stipes closely set in shallow spirals, subulate distal to the base (diamond-shaped in cross-section), nearly woody and persistent at the base; rachises stramineous; laminae pinnate-pinnatifid to 2(3)-pinnate, villous when young, often glabrous at maturity or nearly so; sterile laminae or pinnae free-veined, the veins forked; fertile fronds or pinnae without an expanded lamina, the sporangia borne in clusters on the veinlets; sporangia thick-stalked, globular, with a rudimentary annulus, bearing usually several hundred chlorophyllous, trilete spores.

Widely distributed in temperate to tropical regions; ca. 10 species.

BENEDICT, R. C. 1916. Osmundaceae. North Amer. Fl. 16(1):27–28.

1. Fronds partially dimorphic, with an apical fertile portion; laminae glabrous, 2-pinnate. Laminae ovate to lanceolate, 30–90 cm long, 9–30 cm wide.

117. *O. regalis* var. *palustris*

1. Fronds entirely dimorphic, the sterile and fertile ones separate; laminae tomentose, especially in the pinna axils, pinnate-pinnatifid. Sterile laminae narrowly elliptic, 30–65 cm long, 10–15(25) cm wide.

116. *O. cinnamomea* var. *imbricata***116. *Osmunda cinnamomea* var. *imbricata* (Kunze) Milde, Monogr. Osmund. 95. 1868.**

Osmunda bipinnata L. Sp. Pl. 2:1065. 1753. TYPE: Plate 155 of Plumier's "Traité...", which is based on a specimen collected by Plumier on Hispaniola.

Osmunda imbricata Kunze, Farrnkräuter 2:29, t. 112. 1849. TYPE: Edo. Mérida, Venezuela, Funck & Schlim 1221 (LZ destroyed).

Plants terrestrial, at 1200–1800 m elevation, in swamps, roadside ditches, and open areas, in the Flora area known only from Cerro Tablazo, and the vicinity of Juan Viñas and the Río Macho dam (both Pcia. Cartago). Also from Bermuda, the Greater Antilles, Mexico to Honduras, Venezuela, Colombia, Peru, Brazil, and Paraguay.

According to Fernald (Rhodora 32:75. 1930), this variety differs from var. *cinnamomea* in its narrower (1–2.3 cm wide), more coriaceous, and opaque pinnae.

117. *Osmunda regalis* var. *brasiliensis* (Hook. & Grev.) Pic. Ser. Webbia 31:247. 1977.

Osmunda palustris Schrad. Goett. Gel. Anz. 1824:866. 1824. TYPE: Brazil, Prince Maxmillian von Wied-Neuwied (LE? or M not seen).

Osmunda spectabilis var. *brasiliensis* Hook. & Grev. Bot. Misc. 3:230. 1833. TYPE: Serra do Orgãos, Est. Rio de Janeiro, Brazil, Swainson (K not seen).

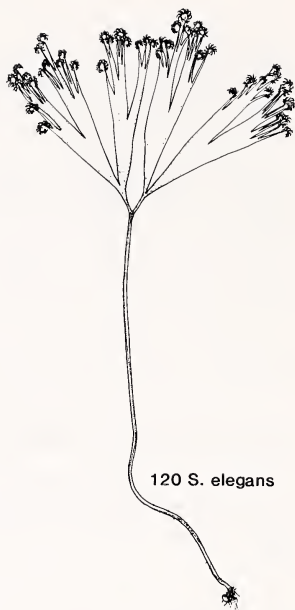
Plants terrestrial, at 1100–1800 m elevation, in swamps, roadside ditches, and open areas, from Cerro Tablazo, Cerro Carpintera and Tapantí, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from El Salvador, Venezuela, Colombia to Peru, and Brazil.



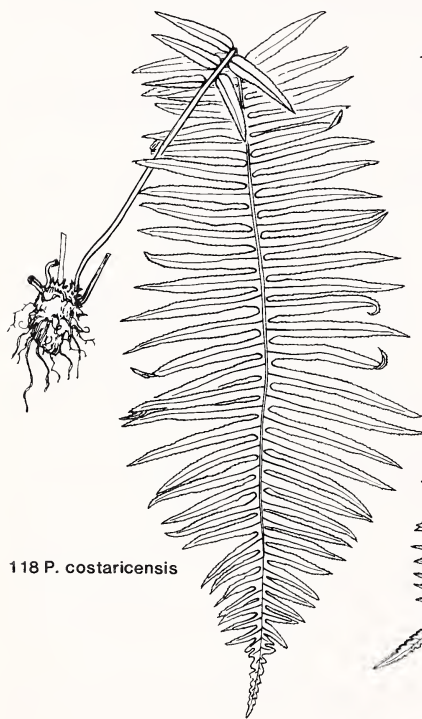
116 *O. cinnamomea*
var. *imbricata*



117 *O. regalis* var. *brasiliensis*



120 *S. elegans*



118 *P. costaricensis*



119 *P. semicordata*



121 *S. poeppigiana*

This variety differs from var. *spectabilis* (Willd.) A. Gray, which occurs from North America to Honduras, in having short-petiolulate (4–6 mm long) pinnae and pinnules, rigid and coriaceous laminae, and pinnules that are round or slightly excised at the upper base.

FIGS. 116–121. *Osmunda*, *Plagiogyria*, and *Schizaea*. FIG. 116. Lamina apices of *O. cinnamomea* var. *imbricata*, Yuncker et al. 5979, Honduras. FIG. 117. Lamina apex of *O. regalis* var. *brasiliensis*, Pittier 7911. FIG. 118. Sterile frond of *P. costaricensis*, Mickel 3194. FIG. 119. Sterile frond of *P. semicordata*, Pittier 2970. FIG. 120. Frond of *S. elegans*, Valerio 1819. FIG. 121. Sterile and fertile fronds of *S. poeppigiana*, Pittier 10580.

PLAGIOGYRIACEAE

Monotypic; see description of *Plagiogyria*.

11. PLAGIOGYRIA (Kunze) Mett.

Plants terrestrial, in wet, usually open areas; rhizomes erect or nearly so, stout, lacking hairs at maturity, bearing fibrous roots; fronds medium- to large-sized, dimorphic, the fertile fronds with contracted pinnae, narrower and often shorter than the sterile ones; stipes closely set in shallow spirals, subulate distal to the base (diamond-shaped or broad triangular in cross-section), blackish, nearly woody and persistent at the base; rachises stramineous, glabrous; laminae pinnatisect to barely pinnate, glabrous, herbaceous; sterile laminae free-veined, the veins simple or 1-forked, often paired at origin, the margins distinctly serrate; fertile laminae greatly reduced, with very wide, usually erose margins that are reflexed when young, free-veined, the veins 1-forked, the branches apparently joining a commissural vein, the sporangia borne on the forked veins, especially distally, thick-stalked, subglobular, the annulus oblique; spores trilete, 48 per sporangium.

Tropical and subtropical, mostly Old World; ca. 35 species. A genus of uncertain position resembling, but perhaps not related to, *Osmunda*.

LELLINGER, D. B. 1971. The American species of *Plagiogyria* sect. *Carinatae*. Amer. Fern J. 61:110–118.

1. Sterile laminae decidedly tapered at the base, the basal pinnae no more than half as long as the longest pinnae. Sterile laminae elliptic, 30–60(90) cm long, 8–14 cm wide.

119. *P. semicordata*

1. Sterile laminae not much tapered at the base, the basal pinnae ca. 2/3 as long as the longest pinnae. Sterile laminae lanceolate, 30–70 cm long, (9)12–15(30) cm wide.

118. *P. costaricensis*118. *Plagiogyria costaricensis* Mett. ex Kuhn, *Linnaea* 36:149. 1869.

Plagiogyria anisodonta Copel. Philipp. J. Sci. 38:409, t. 9. 1929. TYPE: Volcán Poás, Pcia. Alajuela, 2800 m, O. Jiménez 1018 (US).

Plagiogyria denticulata Copel. Philipp. J. Sci. 38:412, t. 12. 1929. TYPE: Cani, 7 mi NE of Mito, Depto. Huánuco, Peru, ca. 8500 ft, Macbride 3432 (US; isotype F).

TYPE: Volcán Barba, Pcia. Heredia, *Wendland 1066* (B or GOET not seen).

Plants terrestrial, at 1800–3300 m elevation, in open areas and subpáramos, from the Cordillera Central and the Cordillera de Talamanca to Cerro Chirripó. Also from Venezuela, Colombia, Peru, and Bolivia.

119. *Plagiogyria semicordata* (K. Presl) Christ, *Farnkr. Erde* 176. 1897.

Lomaridium semicordatum K. Presl, Abh. Königl. Böhm. Ges. Wiss. V, 6:515 (repr. 155). 1851. TYPE: Colombia, collector unknown (PRC not seen).

Plagiogyria biserrata Mett. Abh. Senckenberg. Naturf. Ges. 2:272, t. 15, f. 1–18. 1858. LECTOTYPE: Colonia Tovar, Edo. Aragua, Venezuela, Moritz 400 (B not seen photo 10211; isolectotypes HBG not seen photo 5339, US), chosen by Copeland (Phil. J. Sci. 38:409. 1929).

Plagiogyria obtusa Copel. Philipp. J. Sci. 38:413, t. 13. 1929. TYPE: Near Pico Turquino, Cuba, León 11126 (US; isotype NY).

Plants terrestrial, at 2000–3000 m elevation, in open areas and subpáramos, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Cuba, Jamaica, Mexico, Guatemala, Venezuela, and Colombia to Bolivia.

SCHIZAEACEAE

Rhizomes ascending, short-creeping, multicapital, or long-creeping; hairy, the hairs soft and lax to stiff and moniliform; fronds monomorphic to partially or fully dimorphic, small to medium-sized (to ca. 1 m) or very large and twining; stipes sulcate or sometimes terete, stramineous to castaneous or atropurpureous, often dark only at the base, glabrous or sometimes with an indument like that of the rhizome, not articulate; laminae absent, reduced or flabellate in *Schizaea* and *Actinostachys*, pinnately organized and determinate in *Anemia*, and indeterminate, twining, and very large in *Lygodium*; ultimate segments with free, rarely casually or fully anastomosing veins; sori marginal but sometimes appearing superficial, borne on specialized, nonfoliose ultimate frond segments, protected by a modified segment margin (or exindusiate in *Anemia*); sporangia usually few, large, sessile, symmetrical or eccentric, the thickened cells of the terminal annulus 1–ca. 20, distinct from the remainder of the thin-walled sporangium; spores monolete or trilete, 32–256 per sporangium, distinctly ornamented.

1. Fronds indeterminate, twining, climbing and scrambling on other vegetation. Pinnules or ultimate segments often rather palmate.

14. *Lygodium*

1. Fronds determinate, not twining, climbing, or scrambling..2.

2(1). Sterile laminae 1–3-pinnate, with expanded segments, never flabellate or grass-like.

15. *Anemia*

2(1). Sterile laminae unbranched and grass-like or dichotomously branched to flabellate, never pinnately organized..3.

3(2). Fertile segments (sorophores) pinnate spikes somewhat resembling feathers; sterile portions of fronds dichotomous to flabellate.

12. *Schizaea*

3(2). Fertile segments (sorophores) digitate; sterile portions of fronds undivided, flattened or triangular in cross-section.

13. *Actinostachys*

12. SCHIZAEA J. E. Smith

Plants terrestrial, often in sandy, sterile soil; rhizomes short-creeping or ascending, occasionally branched, densely bristly, the hairs brown, conspicuously septate; fronds small to medium-sized, usually with reduced laminae; stipes approximate, adaxially sulcate, often angular, pilose at the base with hairs like those of the rhizome, longer than the laminae; laminae simple or dichotomously divided, sometimes flabellate, papyraceous, thickened at the margin, glabrous or inconspicuously and thinly pilose, the simple or dichotomously branched veins usually visible; sporangia borne in 2 rows on the narrow, exindusiate segments of the triangular to oblong, pinnatisect to subpinnately branched, laxly hairy sorophores that are borne terminally at the apex or apical margins of the laminae; sporangia pyriform or oblong.

Southern Hemisphere and North America, often in sandy soils; ca. 30 species.

LELLINGER, D. B. 1969. Schizaeaceae (Filicales). In B. Maguire and collaborators. The botany of the Guayana Highland—Part VIII. Mem. New York Bot. Gard. 18:2–11.

1. Laminae almost flabellately divided into usually 8 or 16 segments (2)3–12 mm wide.

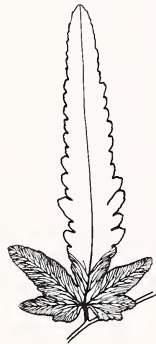
120. *S. elegans*

1. Laminae dichotomously divided into usually 32 or 64 linear segments 1–2 mm wide.

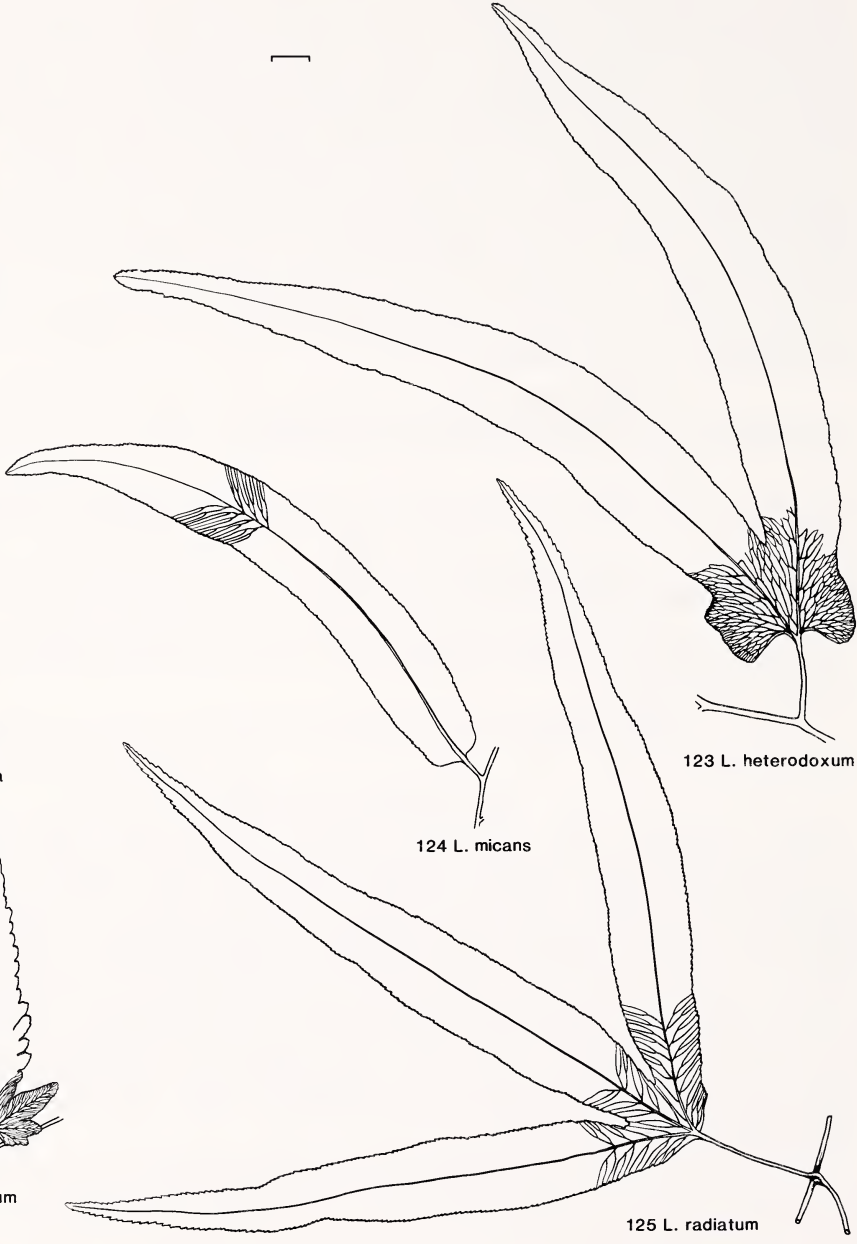
121. *S. poeppigiana*



122 *A. pennula*



126 *L. venustum*



124 *L. micans*

123 *L. heterodoxum*

125 *L. radiatum*

120. *Schizaea elegans* (Vahl) J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:419. 1793.

Acrostichum elegans Vahl, Symb. Bot. 2:104, t. 50. 1791. TYPE: Trinidad, *von Rohr* (C not seen).

Lophidium latifolium Rich. Actes Soc. Hist. Nat. Paris 1:114. 1792. TYPE: French Guiana, *Le Blond* (P? not seen).

Schizaea flabellum Mart. Icon. Pl. Crypt. Bras. 115, t. 55, f. 2. 1834. TYPE: Prov. Rio Negro, Est. Amazonas, Brazil, *Martius* (M not seen; isotypes B not seen photo 10333, BR not seen photo 4755).

Schizaea pacificans Mart. Icon. Pl. Crypt. Bras. 116, t. 56, f. 1. 1834. TYPE: Rio Pureos, Est. Amazonas, Brazil, *Martius* (M not seen; isotype BR not seen).

Schizaea spectabilis Mart. Icon. Pl. Crypt. Bras. 117. 1834. TYPE: Region of the Rio Japurá, Est. Amazonas, Brazil, *Martius* (M not seen).

Schizaea attenuata Beyrich ex Sturm in Mart. Fl. Bras. 1(2):184. 1859. TYPE: "Prope Rio de Janeiro...prope Botofogo," Est. Rio de Janeiro, Brazil, *Beyrich* in 1824 (B not seen photo 10328; isotype L not seen photo 2247).

Schizaea elegans var. *amazonica* Christ, Hedwigia 44:370. 1905. TYPE: Manaus, Est. Amazonas, Brazil, *Ule* 5441 (B not seen photo 10332).

Plants terrestrial, at 0–1200 m elevation, in moist and dryish forests, from Navarro (Pcia. Cartago), the valley of the Río General, the Pacific lowlands of western Panama, the Canal Zone and adjacent Pcia. Panama, and throughout the Chocó. Also from Jamaica, Mexico to Honduras, Nicaragua, Trinidad, Venezuela, Colombia to Bolivia, the Guianas, and Brazil.

121. *Schizaea poeppigiana* Sturm in Mart. Fl. Bras. 1(2):181. 1859.

Schizaea occidentalis Griseb. Cat. Pl. Cub. 273. 1866. TYPE: Near Monte Verde, eastern Cuba, *Wright* 926 (probably GOET not seen; isotype US).

?*Schizaea digitata* var. *orbicularis* Baker, J. Bot. Brit. For. 19:208. 1881. TYPE: Depto. Antioquia, Colombia, 5000–6000 ft, *Whyte* (K not seen).

LECTOTYPE: "Ad Ventanilla de Cassapillo," Peru, *Poeppig* (BR or M not seen), chosen by Underwood (North Amer. Fl. 16(1):38. 1909).

Plants terrestrial, at 600–1200 m elevation, in savannas, from Cerro Negro (Pcia. Limón), Los Palmares (Pcia. S. José?), the valley of the Río Diquís (Pcia. Puntarenas), and Boquete. Also from the Bahamas, the Greater Antilles, Venezuela, Colombia, Peru, Bolivia, and Guyana.

13. ACTINOSTACHYS Wall. ex Hook.

Plants terrestrial, often in sandy, sterile soil; rhizomes short-creeping or ascending, branched, densely bristly, the hairs dark brown, conspicuously septate; fronds medium-sized, without expanded laminae; stipes approximate, triangular in cross-section, bristly at the very base with hairs like those of the rhizome; sporangia borne in 4–6 rows on the narrow, exindusiate segments of the digitately branched, laxly hairy sorophores that are borne terminally at the apex of the fronds; sporangia pyriform or oblong.

Tropical regions, mostly Old World; ca. 10 species.

LELLINGER, D. B. 1969. Schizaeaceae (Filicales). In B. Maguire and collaborators. The botany of the Guayana highland—Part VIII. Mem. New York Bot. Gard. 18:2–11.

FIGS. 122–126. *Actinostachys* and *Lygodium*. FIG. 122. Plant of *A. pennula*, Pittier 10555. FIG. 123. Sterile pinnule of *L. heterodoxum*, Bunting & Licht 668, Nicaragua. FIG. 124. Sterile pinnule of *L. micans*, Hayes 6. FIG. 125. Sterile pinnule of *L. radiatum*, Maxon 4735. FIG. 126. Sterile pinnule of *L. venustum*, Lellinger 698.

122. *Actinostachys pennula* (Swartz) Hook. Gen. Fil. t. 111A. 1842.

Schizaea pennula Swartz, Syn. Fil. 150, 379. 1806. TYPE: "Habitat in America calidiore," collector unknown (S not seen).

Schizaea trilateralis Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 2:137, t. 136. 1805. TYPE: Near the Essequibo River, Guyana, Meyer (HAL not seen).

Schizaea penicillata Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:86. 1810, nom. superfl. TYPE: A renaming of *S. pennula*, and so based on the type of that name.

Actinostachys germanii Fée, Hist. Foug. Antill. [Mém. Foug. 11]: 123, t. 29, f. 3. 1866. TYPE: Sainte-Rose, Guadeloupe, Germain (P not seen), synonymized by Wagner and Quevedo (Abstr. Bot. Soc. Amer. 927. 1985).

Plants terrestrial, at 200–700 m elevation, in open areas, from Los Palmares (Pcia. S. José?), the valley of the Río General, and Alto de Puré, Baja Talamanca (Pcia. Limón). Also from Puerto Rico, the Lesser Antilles, Trinidad, Venezuela, Peru, Guyana, Surinam, Brazil, and Uruguay.

14. LYGODIUM Swartz

Plants terrestrial, scrambling or sometimes high-climbing vines often at forest margins; rhizomes short-creeping, ca. 1 cm in diam., bristly, the hairs stiff, blackish, septate; stipes approximate, blackish and bristly at the base, flexible; rachises elongate, much longer than the stipes, indeterminate; pinnae alternate, reduced to a short or obsolete stalk bearing a single pair of lateral (secondary) branches and terminated by a dormant bud; pinnae or pinnules dichotomously divided or simple and with basal lobes, papyraceous, thickened at the margin, commonly sparsely pilose at least on the veins, the veins free and forked or forming elongate areolae without included veinlets; sporangia borne in 2 rows on the narrow, elongate, simple sorophores, protected by highly modified, scale-like, antrorse folds of the sorophore surface.

Mostly tropical and mostly in the Old World; ca. 40 species.

DUEK, J. J. 1978. A taxonomic revision of *Lygodium* (Filicinae) in America. Feddes Repert. 89:411–423.

LELLINGER, D. B. 1969. Schizaeaceae (Filicales). In B. Maguire and collaborators. The botany of the Guayana highland—Part VIII. Mem. New York Bot. Gard. 18:2–11.

1. Veins of the laminae reticulate. Lateral (secondary) branches each with 1–3(5) stalked, simple or dichotomous pinnules, each with two equal basal lobes.

123. *L. heterodoxum*

1. Veins of the laminae free..2.

2(1). Lateral (secondary) branches usually ca. 3 cm long, bearing a single palmate or dichotomous pinnule. Ultimate segments (10)15–30 cm long, 1.5–2.5 cm wide.

125. *L. radiatum*

2(1). Lateral (secondary) branches usually ca. 5–15 cm long, bearing several simple or pinnate pinnules..3.

3(2). Ultimate segments not articulate, without a node-like swelling at the apex of the stalk; simple pinnules 3–5(8) cm long, 1(2) cm wide distal to the base, lobed at the base, the lobes with a costa.

126. *L. venustum*

3(2). Ultimate segments articulate, with a node-like swelling at the apex of the stalk; simple pinnules (4)9–13 cm long, 1.5–2 cm wide, not or scarcely lobed at the base, the lobes without a costa.

124. *L. micans*

123. *Lygodium heterodoxum* Kunze, Farrnkräuter 2:32, t. 113. 1849.

Hydroglossum spectabile Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:299 (repr. 147). 1849. LECTOTYPE: S. Pedro Tepinapa, Edo. Oaxaca, Mexico, *Liebmann Pl. Mex.* 2634, *Fl. Mex.* 936 (C not seen; isoelectotype US), chosen by A. R. Smith (*Fl. Chiapas* 2:145. 1981).

Hydroglossum mexicanum Fée, Cat. Foug. Mex. [Mém. Foug. 9]: 42. 1857. SYNTYPES: Edo. Oaxaca, Mexico, *Galeotti* 6419 (P or RB not seen); and Mexico, *Linden & Jungers* 763 (P or RB not seen).

TYPE: Mexico, *Galeotti* 6419bis (LZ destroyed; isotypes BR as "6419," the logical lectotype).

Plants terrestrial, at 0–300(800) m elevation, from the Pacific coastal plain and adjacent foothills of Costa Rica to the Peninsula de Burica of Panama. Also from Mexico to Honduras and Nicaragua.

124. *Lygodium micans* Sturm in Mart. Fl. Bras. 1(2):178. 1859.

Lygodium scandens sensu Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 2:138, t. 138. 1805, nom. illeg., non Swartz, 1801. TYPE LOCALITY: Essequibo, Guyana.

Hydroglossum heptaphyllum Schrad. Goett. Gel. Anz. 1824:863. 1824. TYPE: Brazil, *Prince Maximilian von Wied-Neuwied* (M not seen).

Lygodium acuminatum Sturm in Mart. Fl. Bras. 1(2):174, t. 14, f. 12. 1859. TYPE: Mt. Corcovado, Agua de Serra, Est. Rio de Janeiro, Brazil, *Pohl* 3859 (W? not seen; isotype BR not seen photo 4765).

TYPE: Guyana, *Schomburgk* 399 (B not seen; isotype BM not seen).

Plants terrestrial, at ca. 100 m elevation, in the lowlands of central Panama. Also from Nicaragua, Venezuela, Trinidad, Colombia, Peru, Guyana, and Brazil.

This species is closely related to (and some think conspecific with) *L. volubile* Swartz. It differs in having subcordate to truncate sterile pinnules and veins of the fertile segments strigose abaxially, rather than usually oblique-truncate sterile pinnules and veins and surface of the fertile segments densely sericeous abaxially.

125. *Lygodium radiatum* Prantl, Unters. Morph. Gefässkrypt. 2:66. 1881.

Lygodium digitatum D. C. Eaton, Mem. Amer. Acad. Arts N.S., 8:217. 1860, non K. Presl, 1825, nom. illeg. SYNTYPES: Panama Railway at Gatun, Pcia. Colón, *Hayes* 25 (YU not seen; isotypes GH, US); and Falls of the Río Truando, Depto. Chocó, *Schott* 77 (YU not seen; isosyntypes B? not seen, MO).

TYPE: Based on *L. digitatum* D. C. Eaton, and so based on the type of that name.

Plants terrestrial, at 0–400(900) m elevation, in lowland forests and swamps from the valley of the Río General, the Peninsula de Osa, the lowlands of Panama, and the northern half of the Depto. Chocó. Also from Colombia and Peru.

126. *Lygodium venustum* Swartz, J. Bot. (Schrader) 1801(2): 303. 1804.

Hydroglossum hastatum Willd. Sp. Pl. ed. 4, 5:79. 1810, nom. superfl. TYPE: A renaming of *L. venustum* Swartz, and so based on the type of that name.

Hydroglossum hirsutum Willd. Sp. Pl. ed. 4, 5:80. 1810. TYPE: Cumanacoa, Edo. Sucre, Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 19479 not seen microfiche S. I. Library).

Lygodium polymorphum H.B.K. Nov. Gen. Sp. 1:25. 1816, non *Ugena polymorpha* Cav., 1801. TYPE: Mt. Quetepe, below Cumaná and Cumanacoa, Edo. Sucre, Venezuela, *Humboldt & Bonpland* (P-Hb. Humb.? not seen).

Lygodium mexicanum K. Presl, Reliq. Haenk. 1:72. 1825. TYPE: Mexico, *Haenke* (PRC not seen fragm NY).

Lygodium pohlianum K. Presl, Suppl. Tent. Pterid. 105 (postpr. 366). 1845. TYPE: Serra de S. Jezabel and S. Luzia, Est. Minas Gerais, Brazil, *Pohl* (PRC not seen; isotype BR not seen photo 4763).

Lygodium commutatum K. Presl, Suppl. Tent. Pterid. 110 (postpr. 371). 1845. SYNTYPES: Hacienda S. Luca, Depto. Chontales, Nicaragua, *Friedrichsthal* (PRC? not seen); Porto Bello, Pcia. Colón, Panama, *Billberg* (PRC? not seen); Peru, *Poeppig* (PRC? not seen); and Chile, *Cuming* (PRC? not seen).

Lygodium schiedeanum K. Presl, Suppl. Tent. Pterid. 110 (postpr. 371). 1845. TYPE: Based on *Lygodium mexicanum* sensu Schlechtend. & Cham. (*Linnaea* 5:620. 1830), and ultimately on the basis of that name, which is Papantla, Edo. Veracruz, Mexico, *Schiede* (HAL? not seen).

Lygodium schiedeanum var. *tenuilobum* K. Presl, Suppl. Tent. Pterid. 110 (postpr. 371). 1845. TYPE: Papantla, Edo. Veracruz, Mexico, *Schiede* (PRC? not seen).

Lygodium palmatilobum Sturm in Mart. Fl. Bras. 1(2):170, t. 14, f. 6. 1859. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Doellinger* (BR not seen photo 4762).

Lygodium mucronulatum Sturm in Mart. Fl. Bras. 1(2):171, t. 14, f. 9. 1859. SYNTYPES: Near Paramaribo, Surinam, *Ehrhard* (BR? not seen); and near Caracas, Distr. Fed., Venezuela, *Moritz* (B not seen).

Lygodium venustum var. *granatense* Christ, Bot. Jahrb. Syst. 24:145. 1897. TYPE: Grenada, *Eggers* 6293 (P not seen; isotype US).

TYPE: Brazil, *Breynius* (S? not seen), according to Proctor (Fl. Less. Antill. 2:51. 1977).

Plants terrestrial, at 0–600 m elevation, in forests, river banks, and savannas, from the lowlands of Costa Rica and Panama. Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles, Mexico to Nicaragua, and tropical South America.

15. ANEMIA Swartz

Plants terrestrial or sometimes epipetric, often in open areas; rhizomes short-creeping or ascending, hairy, the hairs abundant, long, straight, soft; fronds mostly small, partially or rarely completely dimorphic, the basal pinna pair upright, highly branched, elaminate; stipes approximate, sparsely pilose; rachises stramineous, sparsely pilose; sterile portion of the laminae or sterile fronds oblong or lanceolate to triangular, spreading, 1–3-pinnate, sparsely pilose; fertile portion of the laminae or fertile fronds subglabrous, stramineous, bearing sporangia in 2 rows on the ultimate segments of the fertile portion; sporangia ovoid to globular.

Tropical and subtropical regions, mostly New World, especially Brazil; ca. 90 species.

MICKEL, J. T. 1962. A monographic study of the fern genus *Anemia*, subgenus *Coptophyllum*. Iowa State J. Sci. 36:349–482.

———. 1981. Revision of *Anemia* subgenus *Anemiorrhiza* (Schizaeaceae). Brittonia 33:413–429.

1. Veins entirely anastomosing (partially so in hybrids with *A. hirta*), except at the frond margins. Sterile laminae ovate-deltate, (6)8–22 cm wide, (7)10–30 cm long, the pinnae simple, unlobed, (2)3–4(7) lateral pairs; stipes 10–45 cm long.

133. *A. phyllitidis*

1. Veins entirely free..2.

2(1). Sterile portion of the laminae pinnate, the pinna margins entire to shallowly crenate, never lacerate..7.

2(1). Sterile portion of the laminae or sterile fronds pinnate-pinnatifid to 3-pinnate..3.

3(2). Fronds completely dimorphic, the fertile ones separate from the sterile ones; sterile laminae 1–2.5 cm long, dissected into linear segments ca. 0.5 mm wide.

130. *A. millefolia*

3(2). Fronds partially dimorphic, the fertile portion erect, usually long-stalked and exceeding the sterile portion; sterile portion of the laminae at least 3 cm long, not dissected into linear segments..4.

4(3). Sterile portion of the laminae pinnate-pinnatifid to barely 2-pinnate; rhizomes erect or ascending, the hairs reddish-brown; segments entire or crenately lobed at the apex..6.

4(3). Sterile portion of the laminae 2-3-pinnate; rhizomes short- to long-creeping, the hairs blackish to brown; segments sharply serrate or crenate at the apex..5.

5(4). Sterile segments cuneate at the base, almost stalked, sharply serrate at the apex; sterile laminae drying pale green, often subglabrous. Stipes 4-60 cm long; sterile portion of the laminae lanceolate to deltate, 5-30 cm long, 2-25 cm wide; ultimate segments with nearly parallel veins ca. 0.25 mm distant.

127. *A. adiantifolia*

5(4). Sterile segments not cuneate at the base, broadly attached, crenate at the apex; sterile laminae medium to dark green, drying brown, sparsely pilose. Stipes 4-10(20) cm long; sterile portion of the laminae ovate, 5-8(12) cm long, 2.5-8(10) cm wide; ultimate segments with diverging veins ca. 0.5 mm distant.

134. *A. tomentosa* var. *mexicana*

6(4). Fertile portion of the laminae exceeding the sterile portion, upright. Stipes 2-18(30) cm long; sterile portion of the laminae oblong-lanceate, 3-11 cm long, 1.5-4 cm wide; ultimate segments widest distal to the base, oblanceolate or liguliform, entire, with nearly parallel veins ca. 0.25 mm distant.

129. *A. hirsuta*

6(4). Fertile portion of the laminae shorter than or equalling the sterile portion, not upright. Stipes 5-12 cm long; sterile portion of the laminae elliptic-lanceolate, 6-11 cm long, 3-5 cm wide; ultimate segments widest at the base, oblong, crenately lobed, with diverging veins ca. 0.5 mm distant.

128. *A. clinata*

7(2). Sterile fronds exstipitate or nearly so, the stipes 1-3(5) cm long, forming a basal rosette; pinnae wide, round at the apex. Sterile laminae oblong to obovate-lanceolate, 2-6 cm long, 1.3-2.5 cm wide; stipes of fertile fronds 1-5(9) cm long; sterile portion of fertile laminae similar to the sterile laminae.

131. *A. oblongifolia*

7(2). Sterile fronds with obvious stipes 2-6 cm long, not forming a basal rosette; pinnae narrow, mostly acute to obtuse at the apex. Sterile laminae lanceate, widest at the base, acute at the apex, 3-10 cm long, 2-5.5 cm wide; sterile portion of fertile laminae similar to the sterile laminae.

132. *A. pastinacaria*

127. *Anemia adiantifolia* (L.) Swartz, Syn. Fil. 157. 1806.

Osmunda adiantifolia L. Sp. Pl. 2:1065. 1753. LECTOTYPE: Plate 158 of Plumier's "Traité...", which is based on a specimen collected by Plumier on Hispaniola, chosen by Proctor (Fl. Less. Antill. 2:53. 1977).

Osmunda asplenifolia Sav. in Lam. Encyc. Méth. 4:652. 1798. TYPE: Santo Domingo, Hispaniola, Martin (P-Hb. Lam. not seen photo 2845).

Anemia carvifolia K. Presl, Reliq. Haenk. 1:74. 1825. TYPE: Mexico, Haenke (PRC not seen).

Anemia adiantifolia var. *helveola* Fée, Cat. Foug. Mex. [Mém. Foug. 9]:41. 1857. TYPE: Villa Alta, Edo. Oaxaca, Mexico, Galeotti 6585bis (P not seen).

Anemia adiantifolia var. *distans* Fée, Cat. Foug. Mex. [Mém. Foug. 9]:41. 1857. TYPE: Talca, Edo. Oaxaca, Mexico, Galeotti 6567bis (P not seen).

Anemia adiantifolia var. *pumila* Christ, Bull. Herb. Boissier II, 7:794. 1907. TYPE: Between Cayey and Cidra along the Río Plata, Puerto Rico, Sintenis 2194 (P not seen; isotype US).

Anemia adiantifolia var. *subaurita* Christ, Bull. Herb. Boissier II, 7:794. 1907. TYPE: Utuado, Los Angeles, Puerto Rico, Sintenis 5948 (P not seen).



Plants terrestrial, at ca. 100 m elevation, along rivers, from the Interamerican Highway along the Río Ahogados, 14 km northwest of Liberia (Pcia. Guanacaste). Also from Florida, the Bahamas, the Antilles, Trinidad, Mexico to Honduras, and Venezuela, Ecuador, and Brazil.

128. *Anemia clinata* Mickel, Amer. Fern J. 56:58, t. 4. 1966.

TYPE: Along the Río Perene near Hacienda 3, Colonia Perene, Depto. Junín, Peru, ca. 600 m, *Killip & Smith 25194* (US; isotypes F not seen, NY not seen).

Plants terrestrial, at ca. 800 m elevation, in the Flora area known only from between S. Félix and Cerro Flor, Pcia. Chiriquí (*Allen 1925*, GH not seen, MO not seen, UC, US). Also from Venezuela, Colombia, Peru, and Bolivia.

129. *Anemia hirsuta* (L.) Swartz, Syn. Fil. 156. 1806.

Osmunda hirsuta L. Sp. Pl. 2:1064. 1753. LECTOTYPE: Plate 162 of Plumier's "Traité...", chosen by Lellinger (Proc. Biol. Soc. Wash. 98:366. 1985).

Osmunda filiformis Sav. in Lam. Encyc. Méth. 4:652. 1798. TYPE: "Ex Carolina meridionali" [locality false], collector unknown (P-Hb. Lam. not seen photo 2844).

?*Anemia repens* Raddi, Opusc. Sci. 3:282. 1819; Pl. Bras. Nov. Gen. 1:71, t. 9, f. 2b. 1825. TYPE: Mt. Corcovado, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Anemia dissecta K. Presl, Reliq. Haenk. 1:74, t. 11, f. 4. 1825. TYPE: Mexico, *Haenke* (PRC not seen probable isotype BR not seen photo 4790).

Anemia hirsuta var. *achilleifolia* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:20. 1842, as "*achilleaefolia*." TYPE: Near Zacatepéque and Juquila, Edo. Oaxaca, Mexico, 2000–6000 ft, *Galeotti 6363* (BR not seen photo 4777; isotype LE not seen).

Anemia hirsuta var. *integrifolia* Fourn. Mexic. Pl. 1:139. 1872. TYPE: Ultimately a renaming of *Osmunda filiformis* Sav. in Lam., and so based on the type of that name.

Anemia hirsuta var. *dissecta* Fourn. Mexic. Pl. 1:139. 1872, nom. superfl. TYPE: A renaming of *A. hirsuta* var. *achilleifolia* Martens & Galeotti, and so based on the type of that name.

Anemia hirsuta var. *schwackeana* Christ, Bull. Herb. Boissier II, 2:695. 1902. SYNTYPES: Sta. Luzia do Rio das Velhas, Est. Minas Gerais, Brazil, *Schwacke* (P not seen); S. João d'El Rey, Brazil, *Silveira 403* (P not seen); Chapadão, Est. Goiás, Brazil, *Ule 536, 537, 3204, and 3205* (all P none seen).

Anemia hirsuta var. *subfiliformis* Christ, Bull. Herb. Boissier II, 2:695. 1902. SYNTYPES: Presumably Chapadão, Est. Goiás, Brazil, *Ule 535* (P not seen) and *3203* (P not seen).

Anemia hirsuta var. *humboldtiana* Hieron. Bot. Jahrb. Syst. 34:566. 1905. LECTOTYPE: Between Caripe and Sta. Cruz, Edos. Monagas–Sucre, Venezuela, *Humboldt 459* (B-Hb. Willd. 19495-2 not seen Tryon photo), chosen by Lellinger (Proc. Biol. Soc. Wash. 98:366. 1985).

Plants terrestrial or epipetric, at 0–1200(1700) m elevation, in open areas, often on roadside banks, from the Cordillera Central, the Fila de Cedral, the Meseta Central, the Pacific lowlands of Pcia. Guanacaste to the Canal Zone and adjacent Pcia. Panama, the mountains south of Sta. Fé, and between Las Margarita and El Valle (Pcia. Coclé). Also from the Antilles, Mexico to Nicaragua, Trinidad, Venezuela, Colombia, Peru, Bolivia, and Brazil.

FIGS. 127–137. *Anemia* and *Ceratopteris*. FIG. 127. Frond of *A. adiantifolia*, Lellinger 699. FIG. 128. Frond of *A. clinata*, Allen 1925. FIG. 129. Frond of *A. hirsuta*, Stevens 153. FIG. 130. Plant of *A. millefolia*, Allen 1166. FIG. 131. Plant of *A. oblongifolia*, Duke 8641. FIG. 132. Frond of *A. pastinacaria*, Erlanson 582. FIG. 133. Frond of *A. phyllitidis*, Alfaro 16295. FIG. 134. Plant of *A. tomentosa* var. *mexicana*, Shreve 6738, Mexico. FIG. 135. Sterile frond of *C. pteridoides*, Standley 31624. FIG. 136. Sterile frond of *C. pteridoides* × *richardii*, Pittier 6852. FIG. 137. Sterile frond of *C. thalictroides*, Luetzelburg 12912, Brazil.

Anemia hirsuta is known to hybridize with several other species of *Anemia* in the Flora area, including *A. oblongifolia* from Nuestro Amo (Pcia. S. José) and S. José Island, Pcia. Panama (*Erlanson* 528, GH, US). Gómez (Brenesia 18:156. 1980) has found hybrids with *A. phyllitidis* (*A. ×didicusana* Gómez) along the road to El Rodeo, Villa Colón, Pcia. S. José (Gómez 7130, CR, MICH not seen) and at Navarro, Pcia. Cartago (Gómez 7183, CR); with *A. hirta* from Boruca, Pcia. Puntarenas (*Tonduz* 4439, CR); and with *A. pastinacaria* from near Puriscal, Pcia. S. José (Gómez 853, CR) and from near El Rodeo (Gómez 7131, 7169, both CR).

130. *Anemia millefolium* (Gardn.) K. Presl, Suppl. Tent. Pterid. 80 (postpr. 341). 1845.

Coptophyllum millefolium Gardner, London J. Bot. 1:133. 1842. TYPE: Near Villa de Arayas, Est. Goiás, Brazil, *Gardner* 4083 (K not seen; isotypes F not seen, GH not seen, NY not seen, P not seen photo 3564, U not seen photo 125).

Plants terrestrial, at 600–1000 m elevation, in open areas, from Laguna La Yeguada (Pcia. Veraguas), the vicinity of El Valle, and Cerro Camapana (Pcia. Panama). Also from Venezuela, Colombia, and Brazil.

131. *Anemia oblongifolia* (Cav.) Swartz, Syn. Fil. 156. 1806.

Osmunda oblongifolia Cav. Icon. Descr. Pl. 6:69, t. 592, f. 2. 1801. TYPE: Panama, *Née* (MA not seen), examined by Christensen (Dansk Bot. Ark. 9(3):31. 1937).

Osmunda humilis Cav. Icon. Descr. Pl. 6:69, t. 592, f. 3. 1801. TYPE: Taboga, Pcia. Panama, *Née* (MA not seen).

Anemia pilosa Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:19, t. 2, f. 1. 1842. TYPE: Juquila, Edo. Oaxaca, Mexico, 2000–6000 ft, Galeotti 6353 (BR not seen photos 4785, 4786).

Anemia pumila Klotzsch, Linnaea 18:526. 1845. TYPE: Caripe, Edo. Monagas, Venezuela, *Moritz* 159 (B not seen; isotypes L not seen photo 344, P not seen photo 3512).

Anemia seemannii Hook. London J. Bot. 7:564, t. 16. 1848. TYPE: Taboga, Pcia. Panama, *Seemann* (K not seen fragm NY not seen).

Anemia comea Prantl, Unters. Morph. Gefässkrypt. 2:104. 1881. TYPE: Trapiche de la Concepción, Edo. Oaxaca, Mexico, *Liebmann* 2622 (C not seen; isotype BM not seen photo 7717, fragm US).

?*Anemia presliana* Prantl, Unters. Morph. Gefässkrypt. 2:104. 1881. SYNTYPES: Vella Boa, Est. Goiás, Brazil, *Pohl* (M and W neither seen); Est. Goiás, Brazil, *Gardner* 4087 (W not seen); and Tijuca, Mariana, Est. Minas Gerais, Brazil, *Martius* (M not seen).

Anemia ulei Christ in Schwacke, Pl. Nov. Mineir. 2:36. 1900. SYNTYPES: Serra dos Pyreneos, Est. Goiás, Brazil, *Ule* 386 (P not seen photo 3582) and 3198 (P not seen).

Plants terrestrial or epipetric, at 0–1200 m elevation, in savannas and open areas, from the Pacific coastal plain of northwestern Costa Rica and the adjacent foothills, the lower reaches of the Meseta Central, the mountains of Panama from Boquete to El Valle, between Las Minas and Pese (Pcia. Herrera), and the Canal Zone and adjacent Pcia. Panama. Also from Mexico to Nicaragua, Venezuela to Bolivia, Guyana, and Brazil.

132. *Anemia pastinacaria* Moritz in Prantl, Unters. Morph. Gefässkrypt. 2:110. 1881.

Anemia pilosa var. *longistipes* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:301 (repr. 149). 1849. TYPE: Between Trapiche de la Concepción and Tepitongo, Edo. Oaxaca, Mexico, *Liebmann* (C not seen).

LECTOTYPE: “In convalli del Tigre,” Venezuela or Colombia, *Moritz* 26 (B not seen), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:367. 1985).

Plants terrestrial, at 0–1000 m elevation, in savannas and thickets, from the Pacific coastal plain of Costa Rica and its adjacent foothills, near David and Boquete (Pcia. Chiriquí), near Las Margaritas (Pcia. Coclé), Ocú (Pcia. Herrera), the Canal Zone, and Cerro Campana and S. José Island (Pcia. Panama). Also from Jamaica, Mexico to Honduras, Nicaragua, Trinidad, Venezuela, Colombia, Peru, Bolivia, Surinam, and Brazil.

See *A. hirsuta* for a discussion of hybrids with that species.

133. *Anemia phyllitidis* (L.) Swartz, Syn. Fil. 155. 1806.

Osmunda phyllitidis L. Sp. Pl. 2:1064. 1753. TYPE: Based on plate 156 of Plumier's "Traité...", which is based on a specimen collected by Plumier on Hispaniola.

Anemia fraxinifolia Raddi, Opusc. Sci. 3:282. 1819; Pl. Bras. Nov. Gen. 1:69, t. 8bis. 1825. TYPE: Near Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Anemia sorbifolia Schrad. Goett. Gel. Anz. 1824:864. 1824. TYPE: "Pr. Bah. et Sebastianop.," Brazil, *Maxmilian von Wied-Neuwied* (LE or M not seen; isotype BR not seen photo 4784).

Anemia obliqua Schrad. Goett. Gel. Anz. 1824:864. 1824. TYPE: Brazil, *Maxmilian von Wied-Neuwied* (LE or M not seen).

Anemia longifolia Raddi, Pl. Bras. Nov. Gen. 1:69, t. 8. 1825. TYPE: Near Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Anemia cordifolia K. Presl, Reliq. Haenk. 73, t. 11, f. 3. 1825. SYNTYPES: "Hab. in Mexico et in vallibus Cordillerarum Peruviae," *Haenke* (PRC neither seen).

Anemia haenkei K. Presl, Reliq. Haenk. 1:74. 1825. TYPE: Cordillera de Peru, *Haenke* (PRC not seen).

Anemia densa Link, Hort. Reg. Bot. Berol. 2:142. 1833. TYPE: Cultivated in the garden at Berlin, originally from Brazil, *Link* (B not seen; authentic material HBG not seen photo 5430, L not seen photo 345).

Anemia langsdorffiana K. Presl, Suppl. Tent. Pterid. 89 (postpr. 350). 1845. TYPE: Ilha Sta. Catarina, Est. Sta. Catarina, Brazil, *Langsdorff* (LE not seen).

Anemia phyllitidis var. *caryotideae* Christ, Bull. Herb. Boissier II, 2: 692. 1902. TYPE: Brazil, *Glaziou* (P not seen photo 3573).

Anemia phyllitidis f. *subtripinnatifida* Rosenst. Hedwigia 43:233. 1904. TYPE: Toledo, Est. S. Paulo, Brazil, *Ulbricht* 74 (S not seen).

Anemia phyllitidis f. *auritolobata* Rosenst. Hedwigia 46:159. 1907. SYNTYPES: Porto Alegre, Mun. Sta. Cruz, Est. Rio Grande do Sul, Brazil, *Juergens & Steir* 6b (S not seen); and Lages, Est. Sta. Catarina, Brazil, *Spannagel* (S not seen).

Anemia phyllitidis f. *transitoria* Rosenst. Hedwigia 46:159. 1907. TYPE: Porto Alegre, Mun. Sta. Cruz, Est. Rio Grande do Sul, Brazil, *Juergens & Steir* 6c (S not seen).

Anemia lancea Christ, Bull. Herb. Boissier II, 7:791. 1907. TYPE: Est. Mato Grosso, Brazil, *H. Smith* 143 (P not seen; isotype R not seen).

Anemia phyllitidis var. *pygmaea* Christ in Wettst. Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 79:52, t. 7. 1907. SYNTYPES: Near Yporanga, valley of the Rio Ribeira, Est. S. Paulo, Brazil, 130 m, *Wettstein* (P not seen); and Apiaby, Est. S. Paulo, Brazil, *Puiggari* (P not seen).

Plants terrestrial, at 0–1700 m elevation, in pastures and on banks, from the Cordillera Central, the lower reaches of the Meseta Central, the Fila de Cedral, Cerro Carpintera, S. Isidro del General (Pcia. S. José), the Cordillera de Talamanca (Pcia. Chiriquí), Tonosí (Pcia. Los Santos), Penonomé and El Valle, La Yeguada (Pcia. Veraguas), and Aquarubia (Pcia. Panama). Also from Cuba, Jamaica, Hispaniola, Mexico to Nicaragua, Trinidad, Venezuela, Colombia to Bolivia, Guyana, Surinam, Brazil, Paraguay, Uruguay, and Argentina.

This is the only species of *Anemia* in the Flora with anastomosing veins, which are uncommon in the genus. See *A. hirsuta* for comments on hybrids with that

species. Hybrids with *A. hirta* (L.) Swartz are known from Finca dos Padres (Pcia. S. José) and El Llano (Pcia. Cartago).

134. *Anemia tomentosa* var. *mexicana* (K. Presl) Mickel, Iowa State J. Sci. 36:427. 1962.

Anemia fulva var. *mexicana* K. Presl, Suppl. Tent. Pterid. 84 (postpr. 345). 1845. TYPE: Eastern Mexico, *Leibold* (LZ destroyed).

Plants epipetric, at ca. 750 m elevation, in the Flora area known only from along a stream flowing into Laguna La Yeguada, Pcia. Veraguas (*Armond 505*, DUKE). Also from Hispaniola, Mexico, Venezuela, and Colombia.

PARKERIACEAE

Monotypic; see description of *Ceratopteris*.

16. CERATOPTERIS Link

Plants aquatic, rooted or floating; rhizomes usually erect, obsolete, scaly, the scales sparse, tan, wide, flaccid; fronds medium-sized, dimorphic, the fertile ones longer than the sterile ones, with proportionally longer stipes and with contracted laminae, glabrous, herbaceous; stipes approximate, glabrous, fleshy and collapsing when dry, bearing many long, thick, smooth roots near the base; sterile laminae simple (pinnately lobed) to 3-pinnate, the segments wide, often lanceate, the venation reticulate, the areolae rounded-polygonal, irregular, without included veinlets, sometimes bearing proliferous buds at the pinna or segment bases; fertile laminae 2–3-pinnate, the segments narrow, linear, the venation reduced to a single, central vein and a commissural vein near each margin, not reticulate, the margins wide, revolute, protecting the submarginal sporangia; sporangia borne in 1–4 rows, globular, nearly sessile, the annulus irregularly developed, sometimes absent or vestigial; spores 16 or 32 per sporangium, globular, trilete.

Pantropical and subtropical; 4 species.

LLOYD, R. M. 1974. Systematics of the genus *Ceratopteris* Brongn. (Parkeriaceae) II. Taxonomy. *Brittonia* 26:139–160.

1. Sterile laminae with the ultimate segments acute-attenuate. Plants rooted or floating; sterile laminae 2-pinnate-pinnatifid.

136. *C. pteridoides* × *richardii*

1. Sterile laminae with the ultimate segments round, obtuse, or acute, or the laminae simple..2.

2(1). Sterile laminae pinnate to 3-pinnate, the basal lobes or pinnae alternate; lamina buds usually developing into plantlets only on senescent laminae; plants usually rooted.

137. *C. thalictroides*

2(1). Sterile laminae simple (rarely pinnate or 2-pinnate), the basal lobes or pinnae mostly opposite; lamina buds usually developing into plantlets on actively growing laminae; plants usually floating.

135. *C. pteridoides*

135. *Ceratopteris pteridoides* (Hook.) Hieron. Bot. Jahrb. Syst. 34:561. 1905.

Parkeria pteridoides Hook. Exot. Fl. 2:t. 147. 1825. LECTOTYPE: Essequibo District, Guyana, *Parker* (K not seen), chosen by Lloyd (*Brittonia* 26:156. 1974).

Parkeria lockhartii Hook. & Grev. Icon. Fil. 1:ad t. 97. 1828. TYPE: About 4 mi SW of Arima, Trinidad, *Lockhart* (K not seen).

Ceratopteris parkeri J. Smith, J. Bot. (Hooker) 4:70. 1841, nom. superfl. TYPE: A renaming of *C. pteridoides*, and so based on the type of that name.

Plants aquatic (usually floating), at 0–100 m elevation, in streams and ponds, from near S. Bernardino (Pcia. Guanacaste), the vicinity of Nievecita (Pcia. Bocas del Toro), Madden Lake (Pcia. Colón), the Canal Zone, and the lower Río Truando. Also from Florida, Louisiana, Cuba, Hispaniola, Guatemala, El Salvador, Nicaragua, Trinidad, Venezuela to Peru, the Guianas, Brazil, Paraguay, and Argentina.

136. *Ceratopteris pteridoides* (Hook.) Hieron. × *richardii* Brongn.

Plants aquatic (rooted or floating), at 0–200(600) m elevation, in streams and ponds, from Salinas (Pcia. Puntarenas), Bagaces and north of Upala (Pcia. Guanacaste), the IICA lake near Turrialba (Pcia. Cartago), the vicinity of Ft.

Sherman (Canal Zone), and Matías Hernandez and the vicinity of El Llano (Pcia. Panama). Also from Mexico and El Salvador.

137. *Ceratopteris thalictroides* (L.) Brongn. Bull. Sci. Soc. Philom. Paris III, 8:186. 1821.

Acrostichum thalictroides L. Sp. Pl. 2:1070. 1753. TYPE: Ceylon, *Hermann* (BM-Hb. Hermann III, 42, specimen 377, not seen), according to Lloyd (*Brittonia* 26:148. 1974).

Ellobocarpus oleraceus Kaulf. Enum. Fil. 148. 1824, nom. superfl. TYPE: A renaming of *C. thalictroides* (L.) Brongn., and so based on the type of that name.

Ceratopteris froesii Brade, Arq. Jard. Bot. Rio de Janeiro 18:31, t. 1, f. 4. 1964. TYPE: Campos Gerais de Andorinha, Est. Pará, Brazil, *Froes 19906* (IAN not seen).

Plants aquatic (usually rooted), at 0–200 m elevation, in streams and ponds, from Matapolo and the Hacienda Taboga (Pcia. Guanacaste), Las Sabanas (Canal Zone), the vicinity of Olá (Pcia. Coclé), and between Panama and Chepo (Pcia. Panama). Also from Florida, Jamaica, Mexico, Guatemala, El Salvador, Nicaragua, Trinidad, Venezuela, Ecuador, Surinam, and Brazil.

ADIANTACEAE

Rhizomes usually erect or short-creeping, less commonly long-creeping, rarely glabrous or merely viscid, usually scaly, the scales concolorous or bicolorous, not clathrate, sometimes reduced to bristles, or hairy, the hairs firm to lax, usually brown or reddish-brown, rarely stramineous; fronds small to medium-sized, usually stiffly erect, sometimes lax and pendent; stipes terete or sometimes sulcate, usually brown or atropurpureous, variously scaly, soft-hairy, viscid, or glabrous, not articulate to the rhizome; laminae usually less than 0.5 m long, simple and entire or lobed or up to 4-pinnate; ultimate segments either roundish and often somewhat contracted and bead-like or angular and sometimes also dimidiate and not bead-like, always many-veined; sori marginal or nearly so or distinctly surficial or confined to the false indusium; false indusia absent or thin, usually entire, pale brown, a reflexed and often modified segment margin; sporangia usually numerous, sometimes few per sorus, short-stalked, the stalk usually of 3 rows of cells, the thickened cells of the vertical annulus sharply distinct from the thin-walled cells or not; spores trilete.

1. Fronds or pinnae monomorphic or slightly dimorphic (the sterile and fertile differing slightly in shape)...3.

1. Fronds or pinnae strongly dimorphic (the sterile and fertile differing strongly in shape or in stature)...2.

2(1). Laminae pentagonal, dimorphic, the fertile fronds much longer than the sterile ones.

27. *Hemionitis*

2(1). Laminae ovate, the pinnae dimorphic, the proximal ones sterile and with triangular-lanceolate segments, the distal ones fertile and with nearly linear segments.

17. *Llavea*

3(1). Sporangia confined to the abaxial surface of the false indusia; ultimate segments commonly oblong and dimidiate or trapezoidal to reniform and not dimidiate.

32. *Adiantum*

3(1). Sporangia marginal to surficial, never on the false indusia...4.

4(3). Laminae linear, indeterminate, the pinnae approximate, more or less round, less than 5 mm in diameter, the rachises usually hairy, especially at the apex of the lamina.

30. *Jamesonia*

4(3). Laminae not linear, determinate, the pinnae not round...5.

5(4). Sori exindusiate, surficial along the veins, sometimes protected by hairs, scales, or a wax-like farina...11.

5(4). Sori protected by a false indusium, marginal or nearly so, hairs and scales few or absent, farina absent (except in *Aleuritopteris*)...6.

6(5). Laminae bearing copious, white to yellowish farina on the abaxial surface.

19. *Aleuritopteris*

6(5). Laminae not farinose, sometimes glaucous...7.

7(6). Laminae palmate, the nearly equal pinnae all radiating from the apex of the stipe; sori short, discontinuous.

20. *Adiantopsis*

7(6). Laminae pinnate, with at least two pairs of lateral lobes or pinnae, the basal lobes or pinnae sometimes basiscopically lobed...8.

8(7). Adaxial surface of the stipes and rachises bearing abundant cylindrical to slightly clavate, short hairs.

21. *Mildella*

8(7). Adaxial surface of the stipes and rachises glabrous, scaly, or hairy, not bearing abundant cylindrical to slightly clavate, short hairs...9.

9(8). Laminae pentagonal, pinnatifid or bipinnatifid, at least the basal lobes basiscopically lobed.

24. *Doryopteris*

9(8). Laminae not pentagonal, pinnate or more divided, the basal pinnae basiscopically lobed or not..10.

10(9). Stipes dark reddish-brown, dark brown, or blackish.

18. *Cheilanthes*

10(9). Stipes stramineous to pale brown (except atropurpureous in *P. temifolia*, with mostly ternate pinnae and linear segments).

23. *Pellaea*

11(5). Fronds glabrous, up to ca. 15 cm long; rhizomes rudimentary, the plants annual.

25. *Anogramma*

11(5). Fronds usually hairy, scaly, or with a wax-like farina, rarely glabrous, mostly more than 15 cm long; rhizomes well developed, the plants perennial..12.

12(11). Laminae pentagonal, sparsely pilose on both surfaces, lacking a wax-like farina on the abaxial surface.

29. *Bommeria*

12(11). Laminae not as above..13.

13(12). Laminae pinnate, the pinnae oblong or lanceolate, entire.

28. *Gymnopteris*

13(12). Laminae not as above..14.

14(13). Fronds borne in a line along a usually long-creeping rhizome; laminae sparsely pilose abaxially and often adaxially.

31. *Eriosorus*

14(13). Fronds fasciculate or caespitose from a short-creeping, multicapital, ascending, or erect rhizome; laminae scaly, bearing a wax-like farina, or densely hairy on the abaxial surface, the adaxial surface often glabrous..15.

15(14). Laminae long-triangular or nearly so, widest near the base.

26. *Pityrogramma*

15(14). Laminae oblong, narrowly elliptical, or pentagonal (triangular only in *N. incana*, with ovate, plane, short-stalked ultimate segments), widest near the middle of the lamina.

22. *Notholaena*

17. LLAVEA Lag.

Plants terrestrial or sometimes epipetric or in soil over rocks; rhizomes thick, short-creeping, densely scaly, the scales linear-lanceate, black at the base, reddish-brown changing to stramineous toward the apex, the margins entire; fronds large, membranaceous, strongly dimorphic, essentially glabrous; stipes and rachises stramineous or sometimes pale reddish-brown, deeply sulcate; sterile fronds 2–4-pinnate, the pinnae and pinnules long-stalked, the segments mostly ovate, the veins mostly 2-forked, the margins thickened and closely and irregularly spinulose; fertile fronds 2- or 3-pinnate, the pinnae long-stalked, the segments linear, membranaceous, sparsely pilosulous along their costules, the margins revolute with a continuous false indusium; veins 1-forked; sori elongate along the lateral veins of the segments; sporangia short-stalked.

A morphologically isolated, monotypic genus of Central America.

137a. *Llavea cordifolia* Lag. Gen. Sp. Pl. 33. 1816.

TYPE: "Nova Hispania," collector unknown (probably MA or FI not seen).

Plants terrestrial, at 1800 m elevation, in the Flora area known only from Alto de Morizal, La Palma (Gómez 3112, CR). Also from Mexico and Guatemala.

The divided laminae and pale stipes are reminiscent of a few species of *Pellaea*, but the extremely dimorphic pinnae show that there is no relationship.

18. CHEILANTHES Swartz

Plants terrestrial or epipetric, often in seasonally dry, open areas; rhizomes ascending or short-creeping, rarely long-creeping, densely scaly, the scales narrowly lanceate, often bicolorous, tan with a dark brown central stripe, the margins entire, erose, ciliate or toothed; fronds small, scaly (glandular or hairy in a few species); stipes usually brown, reddish-brown, or atropurpureous, often shiny, scaly especially and often exclusively at the base, terete or subsulcate; rachises resembling the stipes in color and indument; laminae pinnate-pinnatifid to 5-pinnate (mostly 2–3-pinnate), commonly lanceolate, rather coriaceous, often at least slightly hairy and/or scaly, the basal pinnae often inequilateral and basiscopically produced, the ultimate segments small, often bead-like, rarely linear, with usually strongly revolute margins and continuous, narrow to wide, membranaceous, marginal false indusia; veins free, simple or forked, hidden within the lamina tissue; sori usually round but sometimes laterally confluent, at the tips of veins; sporangia short-stalked, often few per sorus.

This morphologically diverse genus of tropical to temperate xerophytes is found in both hemispheres. Some of the ca. 170 species probably can be placed in segregate genera. The taxonomic value of some traditionally generic characters is in doubt because of convergence due to harsh habitats.

KNOBLOCH, I. 1976. Morphological characters in Cheilanthes together with a key to North and Central American species. *Flora* 165:507–522.

1. Laminae bearing viscid glands; stipes at least 3 times longer than the laminae. Laminae compact, ovate-triangular to subpentagonal; fronds 15–30 cm long.

143. *C. kaulfussii*

1. Laminae lacking viscid glands; stipes usually less than 3 times longer than the laminae..2.

2(1). Stipes, rachises, and costae glabrous or nearly so, not villous, or only the stipe bases scaly..5.

2(1). Stipes, rachises, and costae villous, with many reddish or tan hairs and some wide or narrow, hair-like scales..3.

3(2). Laminae predominantly 2-pinnate; ultimate segments oblong, ca. 3 mm long, 1.5 mm wide; rhizomes compact, the stipes approximate.

147. *C. notholaenoides*

3(2). Laminae predominantly 3-pinnate; ultimate segments bead-like, ca. 1 mm long and wide..4.

4(3). Rhizomes long-creeping, the stipes distant; laminae lanceolate, widest near the base.

144. *C. lendigera*

4(3). Rhizomes short-creeping, the stipes approximate; laminae nearly linear, usually widest near the middle.

139. *C. castanea*

5(2). Indusia entire, erose, or incised, not decurrent on the segment axes (except in *C. membranacea*)..7.

5(2). Indusia ciliate or toothed, slightly to greatly decurrent on the segment axes; segments obtuse or round..6.

6(5). Laminae about twice as long as wide; segment margins often sparingly provided with stubby, conical trichomes; ultimate segments undivided or with elongate lateral segments; terminal segments 4–20 times longer than wide; pinnae distant.

142. *C. hirsuta*

6(5). Laminae about as long as wide; segment margins rarely provided with trichomes; ultimate segments mostly with round or only slightly elongate lateral segments; terminal segments typically 2–3(4) times longer than wide; pinnae usually crowded or imbricate.

145. *C. marginata*

7(5). Segments acute to apiculate at the apex..9.

7(5). Segments round at the apex..8.

8(7). Laminae 4-pinnate; terminal pinna and pinnule segments not much longer than the lateral ones; indusia strongly decurrent on the segment margins, (0.5)1 mm wide.

146. *C. membranacea*

8(7). Laminae 3-pinnate or 3-pinnate-pinnatifid; terminal pinna and pinnule segments much longer than the lateral ones; indusia scarcely decurrent on the segment margins, 0.5 mm wide.

141. *C. harrisii*

9(7). Laminae 3-pinnate or less divided (the basal basiscopic pinnules of the basal pinnae pinnate). Fronds 15–20(30) cm long, narrowly lanceolate, 2–4 times longer than wide.

138. *C. angustifolia*

9(7). Laminae 3-pinnate-pinnatifid or more divided (the basal basiscopic pinnule of the basal pinnae pinnate-pinnatifid or 2-pinnate). Fronds 30–45 cm long, ovate-lanceolate, ca. 2 times longer than wide.

140. *C. cuneata*

138. *Cheilanthes angustifolia* H.B.K. Nov. Gen. Sp. 1:21 (fol. 17). 1816.

Allosorus angustifolius var. *minus* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:219 (repr. 67). 1849. LECTOTYPE: Near Yavesia, Edo. Oaxaca, Mexico, *Liebmann Pl. Mex. 2349, Fl. Mex. 231* (C not seen), chosen by A. R. Smith (Fl. Chiapas 2:71. 1981).

TYPE: Joulo, Mexico, 1134 m, *Humboldt* (B not seen).

Plants terrestrial, at 800–1600(2000) m elevation, in forests, often among rocks, from near S. Ramón and Alajuela (Pcia. Alajuela), the mountains around the Meseta Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico to Nicaragua.

139. *Cheilanthes castanea* Maxon, Proc. Biol. Soc. Wash. 32:111. 1919.

TYPE: 12–14 leagues south of Saltillo, Edo. Coahuila, Mexico, *Palmer 1390* (US).

Plants probably terrestrial, at 2000 m elevation, in light forests, in the Flora area known only from near the Hotel La Georgina, Cordillera de Talamanca, Pcia. Cartago (*Gómez 683*, CR). Also from the United States and Mexico.

140. *Cheilanthes cuneata* Kaulf. ex Link, Hort. Reg. Bot. Berol. 2:40. 1833.

TYPE: From cultivated material; a specimen labelled “*Cheilanthes cuneata* Kaulf.” in the hand of Kaulfuss may be the type (B not seen Tryon photo).

Plants terrestrial, at ca. 1600 m elevation, in the Flora area known only from 1–3 km southeast of Jorco, Pcia. S. José (*Mickel 2408*, NY, US). Also from Mexico and Venezuela.

141. *Cheilanthes harrisii* Maxon, Contr. U. S. Natl. Herb. 24:51. 1922.

TYPE: Old England, below Cinchona, St. Thomas Parish, Jamaica, 1050 m, *Harris 12902* (US; isotypes BM, IJ, K none seen, NY).

Plants terrestrial, at 1500–2200 m elevation, often in Oak forests, in the Flora area known only from the vicinity of Sta. María de Dota, Pcia. S. José (*Standley*

41668, US); and from between La Sierra and El Empalme, Pcia. S. José (Jiménez M. 2637, CR, F). Also from Cuba and Jamaica.

142. *Cheilanthes hirsuta* Link, Hort. Reg. Bot. Berol. 2:40. 1833.

?*Allosorus ciliatus* var. *minor* K. Presl, Reliq. Haenk. 1:59. 1825. TYPE: Mexico, *Haenke* (PRC not seen).

Cheilanthes rufescens Link, Hort. Reg. Bot. Berol. 2:39. 1833. PROBABLY AUTHENTIC SPECIMENS: From cultivated material in the botanical garden at Berlin (B not seen fragm US; L not seen photo 755).

Cheilanthes crenulata Link, Hort. Reg. Bot. Berol. 2:41. 1833. PROBABLY AUTHENTIC SPECIMENS: From cultivated material in the botanical garden at Berlin (B not seen fragm US, L not seen photo 754).

Allosorus decompositus Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:48, t. 10, f. 2. 1842. TYPE: Juquila, Edo. Oaxaca, Mexico, 4500–5500 ft, *Galeotti* 6362 (BR not seen).

Cheilanthes pyramidalis Féc, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]: 38, t. 25, f. 3. 1857. SYNTYPES (all from Edo. Mexico, Mexico): Valley of Mexico, *Schaffner* 88; S. Agostin, *Schaffner* 305; Guatimalpan, Las Cruces Mountains, ca. 2700 m, *Schaffner* 304 (all P? none seen).

Pellaea angustifolia var. *elongata* Rovirosa, Pteridogr. Sur México 130. 1910. TYPE: Mesa de Coapilla, Edo. Chiapas, Mexico, *Rovirosa* 1059 (PH not seen fragm US, photo US).

TYPE: From material cultivated in the botanical garden at Berlin, presumably originally from Mexico. The probable holotype is a specimen, doubtless collected by Link, bearing the handwritten label “H. b. Link . . . *Cheilanthes hirsuta*” (B not seen Tryon photo).

Plants terrestrial or epipetric, at 1500–3000 m elevation, in open areas and light forest, often on banks, from Volcán Irazú, Cerro Carpintera, Cerro Tablazo, Jorco (Pcia. J. José), and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico to Honduras and Venezuela and Colombia.

This species is closely related to *C. marginata*; depauperate specimens are especially difficult to identify.

143. *Cheilanthes kaulfussii* Kunze, Linnaea 13:145. 1839.

Cheilanthes viscosa Kaulf. ex Link, Hort. Reg. Bot. Berol. 2:43. 1833, non Carm., 1818, nom. illeg. PROBABLY AUTHENTIC SPECIMEN: From cultivated material in the botanical garden at Berlin, originally from Mexico (L not seen photo 753).

Cheilanthes glandulifera Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:258 (repr. 106). 1849. LECTOTYPE: Between Talea and Hacienda de Sta. Gertrudis, Edo. Oaxaca, Mexico, 4000–5000 ft, *Liebm. Pl. Mex.* 2354, the sheet bearing Prantl's annotation (C not seen; islectotype K not seen), chosen by A. R. Smith (Fl. Chiapas 2:72. 1981).

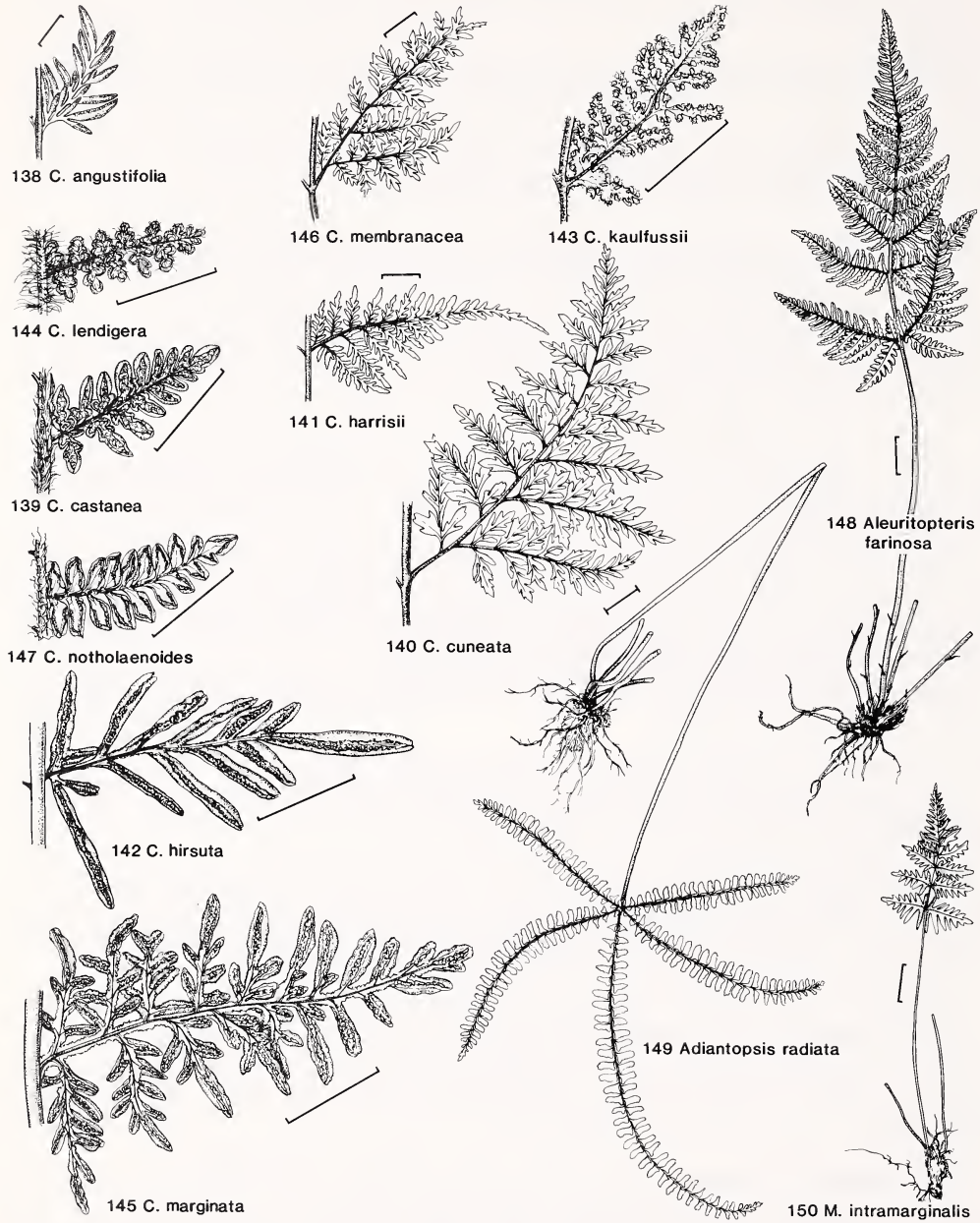
TYPE: A renaming of *C. viscosa*, and so based on the type of that name.

Plants terrestrial or epipetric, at 1000–1400(1800) m elevation, on dry banks and in exposed areas, from the Cordillera Central, Cerro Tablazo, and Jorco (Pcia. S. José). Also from the southwestern United States to Honduras and Colombia.

144. *Cheilanthes lendigera* (Cav.) Swartz, Syn. Fil. 128, 328. 1806.

Peris lendigera Cav. Descr. Pl. 268. 1802. SYNTYPES: Ixmiquilpan, Edo. Hidalgo, Mexico, *Nee* (MA not seen fragm US); and Guaranda, Pcia. Bolívar, Ecuador, *Nee* (MA not seen). See Christensen (Dansk Bot. Ark. 9(3):23. 1937).

Cheilanthes lanuginosa Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:75, t. 20, f. 2. 1842. TYPE: Near Moran and Réal del Monte, Edo. Hidalgo, Mexico, 7500–8500 ft, *Galeotti* 6450 (BR not seen photo 5095).



Cheilanthes minor Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:75, t. 21, f. 1. 1842. TYPE: Edge of the Río Capulalpan, Cordillera Oriental de Oaxaca, Edo. Oaxaca, Mexico, 6500–7500 ft, *Galeotti 6464* (BR not seen photo 5101).

Myriopteris marsupianthes Fée, Gen. Fil. [Mém. Foug. 5]:149, t. 12A, f. 1. 1852. TYPE: Mt. Orizaba, Edo. Veracruz, Mexico, 3400 m, *Martens & Galeotti 6256* (BR or P not seen).

Myriopteris villosa Fée, Gen. Fil. [Mém. Foug. 5]:149, t. 28, f. 3. 1852. TYPE: Mexico, 2000 m, *Galeotti 6478* (BR or P not seen).

Cheilanthes frigida Linden ex T. Moore, Gard. Chron. 1857:772. 1857. TYPE: A specimen labelled “*C. frigida* Hort. Linden . . . (original).” (K-Hort. Veitch not seen Weatherby photo).

Pomatophytum pocillatum M. E. Jones, Contr. W. Bot. 16:12. 1930. TYPE: Ramsey Cañon, Huachuca Mountains, Cochise County, Arizona, *Jones 24690* (POM not seen; isotype US).

Plants epipetric, on stone walls, or terrestrial, at 1100–2300(3400) m elevation, often in exposed areas, from the Fila de Cedral, Volcán Irazú, Volcán Turrialba, Cerro Chirripó, and Volcán Chiriquí. Also from Hispaniola, the southwestern United States to Honduras, and Venezuela to Ecuador.

145. *Cheilanthes marginata* H.B.K. Nov. Gen. Sp. 1:22 (fol. 18), fol. t. 669. 1816.

Allosorus ciliatus K. Presl, Reliq. Haenk. 1:59. 1825, nom. superfl. TYPE: A renaming of *C. marginata* H.B.K., and so based on the type of that name.

TYPE: Near Penipe, Pcia. Chimborazo, Ecuador, 2340 m, *Humboldt* (B not seen).

Plants terrestrial or epipetric, at 1500–3400 m elevation, in low forests and open areas, from the Cordillera Central, Cerro Carpintera, Cerro Tablazo and the Fila de Cedral, and the Cordillera de Talamanca to Volcán Chiriquí. Also from Mexico to Honduras and Venezuela to Bolivia.

This species is similar to *C. membranacea* but is far more delicate and has less divided fronds.

146. *Cheilanthes membranacea* (Davenp.) Maxon, Amer. Fern J. 8:119. 1918.

Pellaea membranacea Davenp. Bot. Gaz. (Crawfordsville) 21:262, t. XVIII, f. 5, 6. 1896. TYPE: Sierra de S. Felipe, Edo. Oaxaca, Mexico, *Pringle 5963* (VT not seen).

Plants terrestrial or epipetric, at 2900–3200 m elevation, from Cerro Vueltas and Cerro Buenavista (Pcia. S. José), and Cerro Chirripó. Also from Mexico and Guatemala.

This species is similar to *C. chaerophylla* (Martens & Galeotti) Kunze and to *C. marginata* but is at least fully 4-pinnate, usually has proportionally longer stipes, and has entire indusia.

FIGS. 138–150. *Cheilanthes*, *Aleuritopteris*, *Adiantopsis*, and *Mildella*. FIG. 138. Basal pinna of *C. angustifolia*, Palmer 177, Mexico. FIG. 139. Median pinna of *C. castanea*, Correll 23285, Mexico. FIG. 140. Basal pinna of *C. cuneata*, Mickel 2408. FIG. 141. Basal pinna of *C. harrisii*, Standley 41668. FIG. 142. Suprabasal pinna of *C. hirsuta*, Standley 29057, Honduras. FIG. 143. Median pinna of *C. kaulfussii*, Brown CR-237. FIG. 144. Median pinna of *C. lendigera*, Stork 411. FIG. 145. Median pinna of *C. marginata*, Brade & Brade (Ros. Fil. Costar. Exs. 115). FIG. 146. Basal pinna of *C. membranacea*, Kellerman 5791, Guatemala. FIG. 147. Median pinna of *C. notholaenoides*, von Tuerckheim 1166, Guatemala. FIG. 148. Plant of *Al. farinosa*, Beaman 3952, Guatemala. FIG. 149. Plant of *Ad. radiata*, Ebinger 416. FIG. 150. Plant of *M. intramarginalis*, Smith 48/133a.

147. *Cheilanthes notholaenoides* (Desv.) Maxon ex Weath. Contr. Gray Herb. 114:34. 1936.

Pteris notholaenoides Desv. Mém. Soc. Linn. Paris 6:299. 1827. TYPE: Hispaniola, collector unknown (P-Hb. Desv. not seen Tryon photo). Desvaux's description of the rachis as tomentose could have come neither from Plumier's t. 58 in the "Traité..." or from his description.

Cheilanthes micromera Link, Hort. Reg. Bot. Berol. 2:36. 1833. TYPE: Based on material cultivated at the botanical garden in Berlin, originally from Mexico. The presumable holotype bears a label "H. b. Link . . . *Cheilanthes micromera* LK." (B-Hb. Link not seen Tryon photo).

Cheilanthes aspidioides Fée, Gen. Fil. [Mém. Foug. 5]:157. 1852. TYPE: San Pedro Nolasco, Edo. Oaxaca, Mexico, ca. 2600 m, *Galeotti* 6557 (P or RB not seen).

Plants terrestrial, at 100? and 3000 m elevation, in the Flora area known only from the Páramo del Jaboncillo, Buena Vista, Pcia. S. José (*Gómez* 884, CR); and from the woods of Boquete near David (8 Dec 1909, *Hélion*, GH, US). The latter locality may be above, and at higher elevation, than David. Also from Texas, possibly Cuba, Hispaniola, Mexico to Belize, and Venezuela.

19. ALEURITOPTERIS Fée

Plants terrestrial or epipetric, in seasonally dry, open areas; rhizomes erect or ascending, scaly, the scales linear-lanceate, weakly bicolorous, the margins entire; fronds medium-sized, largely lacking hairs or scales; stipes brown, reddish-brown, or atropurpureous, shiny, slightly scaly, especially at the base, terete; rachises resembling the stipes in color; laminae 1–2-pinnate- pinnatifid, commonly lanceolate, rather coriaceous, copiously farinose on the abaxial surface, the basal and suprabasal pinnae strongly basiscopically produced; pinnae lanceate, the pinnules elongate, lobed, with continuous, wide, membranaceous, brownish marginal indusia; veins free, simple or forked, hidden within the lamina tissue; sori laterally confluent, at the tips of veins; sporangia short-stalked.

Tropical and subtropical subxerophytes, all but one exclusively in the Old World; ca. 15 species. This genus is sometimes considered to be a synonym of *Cheilanthes*, and some apparent species of *Cheilanthes* do resemble species of *Aleuritopteris*, but the similarities presumably are due to convergence.

148. *Aleuritopteris farinosa* (Forssk.) Fée, Gen. Fil. [Mém. Foug. 5]:153, t. 12B, f. 1. 1852.

Pteris farinosa Forssk. Fl. Aegypt.-Arab. 187. 1775. TYPE: Yemen, *Forsskål* (isotype BM not seen photo 6695).

Cheilanthes pulverulacea K. Presl, Reliq. Haenk. 1:64. 1825. TYPE: Mexico, *Haenke* (PRC not seen).

Aleuritopteris mexicana Fée, Gen. Fil. [Mém. Foug. 5]:154. 1852. TYPE: Llano Verde, Edo. Oaxaca, Mexico, 2000 m, *Galeotti* 6551 (presumably P not seen; isotype BR not seen).

Plants terrestrial or epipetric, at 100–2000 m elevation, from Hacienda Palo Verde, Cerro Guyacán (Pcia. Guanacaste), Volcán Irazú, and scattered localities in the Cerro de Talamanca from above Copey de Dota (Pcia. S. José) to Cerro Punta and near David (both Pcia. Chiriquí). Also from Jamaica, Hispaniola, Mexico, Guatemala, and Peru.

This species, which is fairly common in Mexico, is rare in the Flora area. Apparently it is becoming more widespread and frequent as drier habitats appear due to deforestation and climatic change.

20. ADIANTOPSIS Fée

Plants terrestrial among rocks or epipetric, usually not in open areas; rhizomes erect, scaly, the scales narrowly lanceate, weakly bicolorous, paler at the entire margins; fronds medium-sized, palmately divided, glabrous; stipes blackish to dark brown, shiny, scaly only at the base, terete; costae like the rachises except uniformly alate, the alae brown, membranaceous; pinnules dimidiate, oblong, faintly acroscopically auriculate, the margins slightly revolute; veins free, simple or forked; sori round, discrete, protected by discrete, scarious, whitish, entire indusia; sporangia short-stalked, few per sorus.

MAXON, W. R. 1908. The Cuban species of *Adiantopsis*. *Contr. U. S. Natl. Herb.* 10:485–486.

Tropical subxerophytes, all but one in the New World; ca. 6 species. The species on Madagascar may be only distantly, if at all, related, and is more likely to be related to species of *Cheilanthes* from Africa.

149. *Adiantopsis radiata* (L.) Fée, *Gen. Fil. [Mém. Foug. 5]:145. 1852.*

Adiantum radiatum L. *Sp. Pl.* 2:1094. 1753. LECTOTYPE: A specimen labelled “*Adiant. 3 radiatum*” in the hand of Linnaeus (LINN 1252.1 not seen microfiche S. I. Library), perhaps collected by Sloane in Jamaica, chosen by Lellinger (*Mem. New York Bot. Gard.* 23:3. 1972).

Plants terrestrial, at 0–400 m elevation, from the vicinity of Los Chiles (Pcia. Alajuela), Ancon Hill (Canal Zone), and Cerro Azul (Pcia. Panama). Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles, Mexico to Honduras, Nicaragua, Trinidad, Venezuela, Colombia, Peru, Bolivia, Guyana, Brazil, Paraguay, and Argentina.

21. MILDELLA Trev.

Plants terrestrial or epipetric, usually on dry banks in open areas; rhizomes branched, creeping to ascending, the fronds clustered near the rhizome apices, densely scaly, the scales linear-lanceate, strongly bicolorous to concolorous; fronds small, glabrous; stipes and rachises chestnut-colored to dark brown, adaxially grooved, the groove provided with bicellular, short, stiff hairs; laminae pinnate-pinnatifid to 2-pinnate, long-lanceolate to ovate-triangular, the proximal pinnae inequilaterally triangular, the distal segments simple, adnate, linear to triangular; veins free, simple or forked; indusia scarious, vaulted, inframarginal at maturity; sporangia short-stalked, typically 2 per sorus.

Mostly Old World subtropics of China with extensions to Tibet and India; 8 species. The New World species are more tropical, with *M. intramarginalis* locally abundant on dryish, roadside banks and perhaps readily cultivated in terraria.

HALL, C. C. & D. B. LELLINGER. 1967. A revision of the fern genus *Mildella*. *Amer. Fern J.* 57:113–134.

150. *Mildella intramarginalis* (Kaulf. ex Link) Trevis. *Rendiconti Ist. Lombardo, Milano II, 9:810. 1876, var. intramarginalis.*

Pteris intramarginalis Kaulf. ex Link, *Hort. Reg. Bot. Berol.* 2:34. 1833, as “*inframarginalis*.” LECTOTYPE: Cultivated in the Botanical Garden at Berlin, *Link* (B), chosen by Hall and Lellinger (*Amer. Fern J.* 57: 119–120. 1967).

Plants terrestrial, at 900–2000 m elevation, on banks and roadsides, from the Cordillera Central, Cerro Tablazo, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico to Nicaragua.

22. NOTHOLAENA R. Br.

Plants terrestrial or epipetric, often in seasonally dry, open areas; rhizomes short-creeping to ascending, branched, scaly, the scales concolorous or bicolorous, lax to stiff, sometimes bearing spine-like teeth; fronds small- to medium-sized, scaly, hairy, or farinose; stipes terete, scaly at least at the base, usually reddish-brown to dark brown; rachises resembling the stipes in color and indument; laminae mostly pinnate-pinnatifid to 3-pinnate, commonly oblong, sometimes ovate or pentagonal, rather coriaceous, the pinnae entire to pinnatifid, pinnate, or more divided, commonly scaly or farinose on the abaxial surface, the margins usually plane or slightly revolute; veins free, simple or forked, hidden within the lamina tissue; sori submarginal, commonly oblong; sporangia short-stalked, many per sorus.

Tropical and subtropical (rarely temperate) xerophytes, mostly New World; ca. 35 species, but properly subject to division.

TRYON, R. 1956. A revision of the American species of *Notholaena*. Contr. Gray Herb. 179:1–106.

1. Laminae scaly, not farinose..5.

1. Laminae farinose, the farina white, cream, or yellow, not scaly..2.

2(1). Farina white..4.

2(1). Farina yellow or yellowish..3.

3(2). Laminae subpentagonal, 1–2 times longer than wide. Laminae 3–7 cm long, 2–6 cm wide, 2-pinnate-pinnatifid, the basal basiscopic pinnules of the basal pinnae greatly elongate.

158. *N. sulphurea*

3(2). Laminae linear, 5–20 times longer than wide. Laminae 5–15 cm long, 1–1.5(2) cm wide, pinnate-pinnatifid, the basal basiscopic pinnules of the basal pinnae not elongate.

151. *N. affinis*

4(2). Laminae 3-pinnate; ultimate segments ovate, short-stalked; rhizome scales concolorous; stipe scales few, only at the base. Laminae 5–15 cm long, 1.5–6 cm wide, the basal basiscopic pinnules not elongate.

156. *N. incana*

4(2). Laminae 2-pinnate-pinnatifid; ultimate segments oblong, sessile, broadly attached at the base; rhizome scales bicolorous; stipe scales many, scattered along the stipe. Laminae 5–15 cm long, 2–7 cm wide, the basal basiscopic pinnules greatly elongate.

154. *N. candida* var. *candida*

5(1). Laminae lanceolate to oblanceolate, widest at or distal to the middle; fronds nearly exstipitate; all pinnae sessile. Laminae 7–32 cm long, 3–6 cm wide, pinnate-pinnatifid; stipe base and rhizome scales dark brown.

153. *N. brachypus*

5(1). Laminae linear; fronds decidedly stipitate; at least the lower pinnae not sessile..6.

6(5). Pinnae pinnatisect, bipinnatifid, or pinnate-pinnatifid; stipe base scales blackish. Laminae 8–25 cm long, 1.5–4 cm wide.

155. *N. galeottii*

6(5). Pinnae lobed to pinnatifid; stipe base scales not blackish..7.

7(6). Rhizome scales concolorous, reddish at the margins, dark brown at the center; scales of the abaxial surface of the pinnae cream-colored in mass. Laminae 15–30 cm long, 1–2.5 cm wide.

152. *N. aurea*

7(6). Rhizome scales bicolorous, reddish to nearly stramineous; scales of the abaxial surface of the pinnae brown or reddish-brown in mass. Laminae 20–30(60) cm long, 2–4 cm wide.

157. *N. sinuata* var. *sinuata*

151. *Notholaena affinis* (Mett.) T. Moore, Ind. Fil. 233. 1861.

Cheilanthes affinis Mett. Abh. Senckenberg. Naturf. Ges. 3:63. 1859. TYPE: Mexico, *Aschenborn* (B not seen photo GH not seen).

Plants epipetric, at 0–100 m elevation, in dry to moist forest areas on peridotite cliffs, from along the Pacific coast from Playa Panama near Playa del Coco to Punta Guiones (both Pcia. Guanacaste). Also from Mexico to Honduras and Nicaragua.

152. *Notholaena aurea* (Poir.) Desv. Mém. Soc. Linn. Paris 6:219. 1827.

Pteris aurea Poir. Encyc. Méth. 5:710. 1804. TYPE: Peru, *J. de Jussieu* (P-Hb. Juss. 1333 not seen photo 3098).

Acrostichum bonariense Willd. Sp. Pl. ed. 4, 5:114. 1810. TYPE LOCALITY: “Bonaria” [Buenos Aires, Argentina, but perhaps actually from Mexico] (B not seen photo GH).

Cheilanthes ferruginea Willd. ex Link, Enum. Hort. Berol. Alt. 2:463. 1822. TYPE LOCALITY: “America meridionali” (B not seen photo GH).

Notholaena chiapensis Rovirosa, Pteridogr. Sur México 229, t. 48, f. 1–6. 1910. TYPE: Near El Sacramento, Edo. Chiapas, Mexico, 2000 m, *Rovirosa 1077* (PH not seen fragm and photo US; isotype GH).

Plants epipetric, at 1200 m elevation, in the Flora area known only from Volcán Tenorio, Pcia. Guanacaste (*Gómez 1050*, CR) and from an unlocalized collection from Costa Rica (*Brade 136*, G not seen, P not seen). Also from the southwestern United States, Jamaica, Hispaniola, Mexico to Honduras, and Colombia to Argentina and Chile.

153. *Notholaena brachypus* (Kunze) J. Smith, Ferns Brit. For. 172. 1866.

Cheilanthes squamosa var. *brachypus* Kunze, Linnaea 18:340. 1845. TYPE: Mexico, *Leibold 52* (B not seen photo GH; isotype K not seen photo GH).

Plants terrestrial, at 0–1000 m elevation, in moist to dry forests and open areas, from Pcia. Guanacaste and the lower reaches of the Meseta Central. Also from Mexico to Nicaragua.

154. *Notholaena candida* (Martens & Galeotti) Hook. Sp. Fil. 5:110. 1864.

Cheilanthes candida Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:73, t. 20, f. 1. 1842. TYPE: Guadalajara, Edo. Jalisco, Mexico, *Galeotti 6442* (BR not seen photo 5092).

Ceropteris monosticha Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:44, t. 22, f. 2. 1857. TYPE: Near Orizaba, Edo. Veracruz, Mexico, *Schaffner 155* (P or RB not seen).

Cheilanthes furfuracea K. Presl ex W. Koch, Wochenschr. Gärtnerei Pflanzenk. 1:3. 1858, nom. illeg. TYPE: A renaming of *C. candida* Martens & Galeotti, and so based on the type of that name.

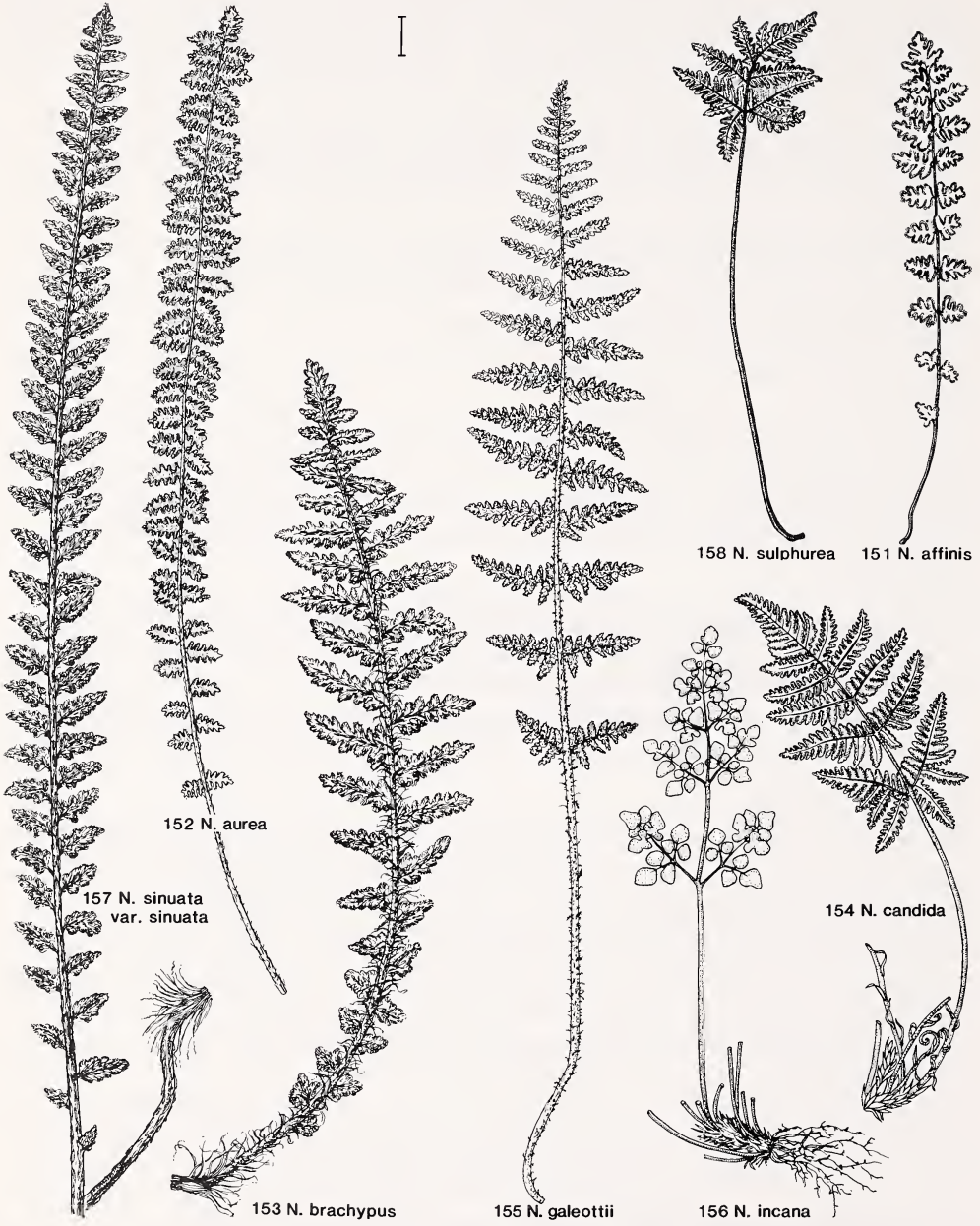
Notholaena sulphurea var. *alba* Mett. ex Kuhn, Abh. Naturf. Ges. Halle 11:32. 1869. TYPE LOCALITY: Mexico.

Plants epipetric, at 700 m elevation, in the Flora area known only from the Brasil hydroelectric plant, Sta. Ana, Pcia. S. José (*Gómez 7193* and *7243*, both CR). Also from Mexico, Guatemala, Honduras, and Nicaragua.

155. *Notholaena galeottii* Fée, Gen. Fil. [Mém. Foug. 5]:159. 1852.

Notholaena arsenii Christ, Notul. Syst. (Paris) 1:232. 1910. LECTOTYPE: Tetela, Edo. Puebla, Mexico, 2170 m, *Arsène 2046* (P not seen), chosen by Tryon (Contr. Gray Herb. 179:55. 1956).

Notholaena hyalina Maxon, Amer. Fern J. 5:4. 1915. TYPE: S. José Pass, Edo. S. Luis Potosí, Mexico, *Pringle 3297* (US).



TYPE: Caputalpan, Edo. Oaxaca, Mexico, 3000 m, *Galeotti* 6565 (P? not seen; isotypes BM not seen photo 7526, BR not seen, K not seen).

Plants epipetric, at 3000 m elevation, in the Flora area known only from Volcán Turrialba (*Gómez* 899, CR). Also from southern Mexico and Guatemala.

156. *Notholaena incana* K. Presl, Reliq. Haenk. 1:19, t. 1, f. 2. 1825.

Gymnogramma candida Mett. Abh. Senckenberg. Naturf. Ges. 3:50. 1859. LECTOTYPE: Valle de Mexico, Mexico, *Schmitz* 231 (B not seen Weatherby photo), chosen by Maxon and Weatherby (Contr. Gray Herb. 127:5. 1939).

LECTOTYPE: Mexico, *Haenke* (PRC not seen photo GH not seen), chosen by Maxon and Weatherby (Contr. Gray Herb. 127:5, 7. 1939).

Plants epipetric, at 1400–1500 m elevation, in the Flora area known only from near Prusia de Cartago, Pcia. Cartago (*Gómez* 7156, CR). Also from Hispaniola, Mexico, and Guatemala.

157. *Notholaena sinuata* (Swartz) Kaulf. Enum. Fil. 135. 1824, var. *sinuata*.

Acrostichum sinuatum Lag. ex Swartz, Syn. Fil. 14. 1806. TYPE LOCALITY: “Peru.” If the type specimen was collected by Lagasca, the locality must surely be Mexico. Lagasca’s original herbarium was destroyed, but type material may be in FI, MA, MEXU, or S.

Notholaena tectoria Desv. Mém. Soc. Linn. Paris 6:219. 1827. TYPE: Peru, collector unknown (P not seen photo GH).

Notholaena chalcoplepis A. Braun ex Kunze, Linnaea 13:135. 1839. TYPE: Mexico, *Karwinsky* in 1827 (B not seen photo GH; isotype P not seen photo GH).

Notholaena laevis Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:46. 1842. TYPE: South of Sola, Edo. Oaxaca, Mexico, *Galeotti* 6350 (BR not seen; isotypes K, B neither seen).

Notholaena sinuata var. *integra* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:213 (repr. 61). 1849. TYPE: A renaming of *N. laevis* Martens & Galeotti, and so based on the type of that name.

Notholaena crassifolia T. Moore & Houlst. Gard. Mag. Bot. 3:20. 1851. TYPE: From cultivated material, *Henderson* (not seen).

Notholaena pruinosa Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:78. 1857. TYPE: Valleys of Toluca and Orizaba, Mexico, *Schaffner* 167c (P or RB not seen).

Notholaena deltoidea Baker, Syn. Fil. ed. 2, 514. 1874. TYPE: Mexico, *Leibold* (K not seen photo GH).

Notholaena sinuata var. *pinnatifida* Farw. Amer. Midl. Naturalist 12:283. 1931. TYPE: Bear Mountains, New Mexico, *Rusby* B1 (MICH not seen).

Plants terrestrial or epipetric, up to 2000 m elevation, from Volcán Poás and the vicinity of Hotel Robert on Volcán Irazú, and from two unlocalized specimens collected in Costa Rica. Also from Hispaniola, the southwestern United States to Honduras, Nicaragua, and Venezuela and Colombia to Argentina.

158. *Notholaena sulphurea* (Cav.) J. Smith in Seem. Bot. Voy. Herald 1:233. 1854.

Pteris sulphurea Cav. Descr. Pl. 269. 1802. TYPE: Chimapán [Zimapan], Edo. Hidalgo, Mexico, *Née* (MA not seen; isotypes F, G not seen).

FIGS. 151–158. *Notholaena*. FIG. 151. Frond of *N. affinis*, Standley 74006, Guatemala. FIG. 152. Frond of *N. aurea*, Tonduz 756, Guatemala. FIG. 153. Frond of *N. brachypus*, Jiménez L. 347. FIG. 154. Frond of *N. candida*, Maxon 3368, Guatemala. FIG. 155. Frond of *N. galeottii*, Pringle 3297, Mexico. FIG. 156. Plant of *N. incana*, Hatch & Wilson 335, Guatemala. FIG. 157. Frond of *N. sinuata* var. *sinuata*, Williams et al. 21855, Guatemala. FIG. 158. Frond of *N. sulphurea*, Copeland, Mexico.

Notholaena cretacea Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:216 (repr. 64). 1849. TYPE: S. Lorenzo, Tehuacán, Edo. Puebla, Mexico, *Liebmann* (C not seen; isotypes K not seen, P not seen, US).

Cheilanthes borsigiana Reichenb. f. & Warsz. ex W. Koch, Wochenschr. Gärtnerei Pflanzenk. 1:2. 1858. TYPE: Peru, *Warszewicz* (B not seen Weatherby photo).

Notholaena candida var. *lutea* Hook. Sp. Fil. 5:111. 1864. TYPE: Depto. Huánuco, Peru, *Mathews 981* (K not seen).

Cheilanthes lepida Phil. Anales Univ. Chile 94:355. 1896. TYPE: Copiapó, Pcia. Atacama, Chile, *Geisse* (SGO not seen photo GH not seen).

Plants terrestrial or epipetric, at 100–3000 m elevation, in the Flora area known only from Volcán Turrialba (*Gómez 900*, CR), the Pacific side of Aguacate, Pcia. Puntarenas (*Gómez 1082*, CR), and Panama City, Pcia. Panama (*Seemann* in 1847, BM not seen). Also from Mexico, Guatemala, Nicaragua, Colombia, Peru, and Chile.

23. PELLAEA Link

Plants epipetric or terrestrial, often on cliffs or boulders in pastures or open areas; rhizomes creeping, ascending, or erect, scaly, the scales very narrow, concolorous or bicolorous, tan and sometimes with a blackish central stripe, the margins entire to erose; fronds small- to medium-sized, stipes and rachises pale or dark, even atropurpureous, terete or adaxially sulcate; laminae 1–3(4)-pinnate, firmly herbaceous to coriaceous, usually glabrous, sometimes glaucous, deltate-lanceate to oblong, the ultimate segments in most species elliptical or nearly so, with revolute margins; veins free, usually forked, hidden within the lamina tissue in most species; sori round to elongate, borne at the apex of the veins, often laterally confluent; sporangia short-stalked, many per sorus.

Tropical and subtropical, mostly New World; ca. 80 species.

TRYON, A. F. 1957. A revision of the fern genus *Pellaea* section *Pellaea*. Ann. Missouri Bot. Gard. 44:125–193.

1. Veins visible on both abaxial and adaxial surfaces of the laminae; ultimate segments broadly attached to the costae or costules; laminae herbaceous. Laminae lanceolate to deltate-lanceolate, 8–20 cm long, 5–18 cm wide, 2–3-pinnate-pinnatifid; axes glabrous or with a few pale, narrow, hair-like scales; ultimate segments lanceolate to oblong.

160. *P. skinneri*

1. Veins not visible on either surface of the laminae; ultimate segments stalked or sessile, narrowly attached to the costae or costules; laminae coriaceous..2.

2(1). Laminae oblong; pinnae ternate; stipes atropurpureous, glabrous. Laminae 7–22 cm long, 1.5–3.5 cm wide; ultimate segments oblong to linear.

161. *P. ternifolia*

2(1). Laminae lanceate; pinnae pinnately divided; stipes stramineous, densely pilosulous. Laminae 30–60 cm long, 10–15 cm wide; rachises, costae, and longer costules flexuous; ultimate segments ovate.

159. *P. ovata*

159. *Pellaea ovata* (Desv.) Weath. Contr. Gray Herb. 114:34. 1936.

Pteris ovata Desv. Mém. Soc. Linn. Paris 6:301. 1827. TYPE: Peru, *collector unknown* (P-Hb. Desv. not seen), examined by Weatherby (Contr. Gray Herb. 114:34. 1936).

Pteris flexuosa Kaulf. ex Schlechtend. & Cham. Linnaea 5:614. 1830. TYPE: Near Jalapa, Edo. Veracruz, Mexico, Aug 1828, *Schiede & Deppe* (B not seen).

Plants epipetric or occasionally terrestrial, at 1400–2000(3100) m elevation, in open and lightly forested areas, often on slopes and banks, from the Cordillera Central and the Fila de Cedral. Also from the southwestern United States, Hispaniola, Mexico to Honduras, Nicaragua, Venezuela to Bolivia, and Argentina.

160. *Pellaea skinneri* Hook. Sp. Fil. 2:141, t. 118B. 1858.

Pellaea flavescens Fourn. Mexic. Pl. 1:119. 1872, nom. illeg., non Fée, 1869. TYPE: Cuernavaca, Edo. Morelos, Mexico, *Bourgeau* (P not seen).

TYPE: Guatemala, *Skinner* (K not seen Weatherby photo).

Plants terrestrial, at 0–100(600) m elevation, from Palmira de Guanacaste and Playa Hermosa (both Pcia. Guanacaste), and Pte. de la Garita (Pcia. Alajuela). Also from Mexico, Guatemala, El Salvador, Nicaragua, and Colombia.

161. *Pellaea ternifolia* (Cav.) Link, Fil. Sp. 59. 1841.

Pteris ternifolia Cav. Descr. Pl. 266. 1802. LECTOTYPE: Guarimaya Valley near Guamantanga, Depto. Lima, Peru, *Née* (MA not seen; isoelectotype F not seen), chosen by Christensen (Dansk Bot. Ark. 9(3):22. 1937).

Pteris peruviana Poir. Encyc. Méth. 5:718. 1804. TYPE: Peru, *Jussieu* (P not seen photo 3099; isotype B-Hb. Willd. 19980 not seen microfiche S. I. Library).

Pteris subverticillata Swartz, Syn. Fil. 103. 1806, nom. superfl. TYPE: A renaming of *P. ternifolia*, and so based on the type of that name.

Pteris triphylla Bertero ex Colla, Herb. Pedem. 6:199. 1836. TYPE: Chile, *Bertero* in 1828 (TO not seen; isotypes GH not seen, SGO not seen).

Pellaea weddelliana Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:74. 1857. LECTOTYPE: "Province de Tomina," Bolivia, *Weddell* 3778 (K not seen; isoelectotypes P not seen, YU not seen), chosen by A. F. Tryon (Ann. Missouri Bot. Gard. 44:150. 1957).

Adiantum tematum Sessé & Moc. Pl. Nov. Hisp. 182. 1890; ed. 2. 169. 1893, nom. illeg., non Humb. & Bonpl. ex Willd., 1810. TYPE: Near Sta. Rosa, Edo. Guanajuato, Mexico, *Sessé & Mociño* (MA not seen).

Pellaea ternifolia var. *petiolulata* C. Chr. in Aspl. Ark. Bot. 20A(7): 18. 1926. TYPE: Chiguana, Depto. Potosí, Bolivia, 4000 m, *Asplund* 3071 UPS: isotype US).

Pellaea brandegeei C. C. Hall, Amer. Fern J. 37:111. 1947. TYPE: Cape region, Edo. Baja California Sur, Mexico, *Brandegee* in 1893 (UC).

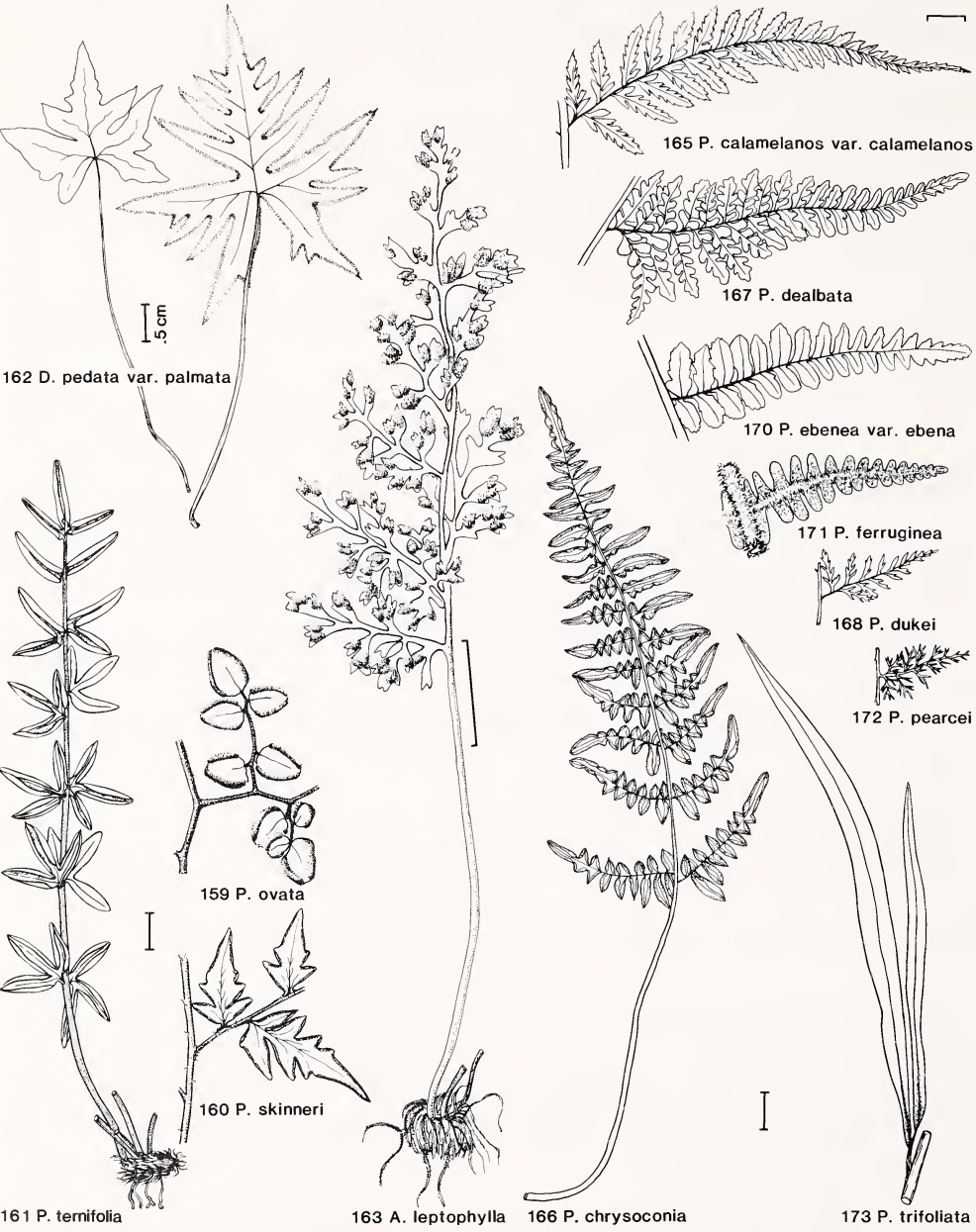
Plants epipetric, at 1500–2000 m elevation, in the Flora area known only from Prusia de Cartago, Pcia. Cartago (*Gómez* 7139, CR) and from Pico Blanco, Pcia. S. José (*Gómez* 882, CR). Also from the southwestern United States, Hispaniola, Mexico to Honduras, Nicaragua, Venezuela to Bolivia, Argentina, and Chile.

24. DORYOPTERIS J. Smith

Plants terrestrial in forests and on roadside banks; rhizomes short-creeping to erect, scaly, the scales narrowly lanceate, usually bicolorous, tan with a narrow, blackish central stripe, the margins entire; fronds medium-sized, often slightly dimorphic with the fertile fronds taller than the sterile ones; stipes atropurpureous, shiny, much longer than the laminae, usually terete, mostly glabrous; laminae pentagonal, broadly deltate, the basal pinnae basiscopically lobed or produced, herbaceous, glabrous, with revolute margins and continuous, narrow, marginal indusia; veins anastomosing without included veinlets or free in some species; sori laterally confluent, continuous around the frond margin; sporangia long-stalked.

Tropics and subtropics, mostly New World; ca. 35 species.

TRYON, R. M., Jr. 1942. A revision of the genus *Doryopteris*. Contr. Gray Herb. 143:1–80.



162. *Doryopteris pedata* var. *palmata* (Willd.) Hicken, Revista Mus. La Plata 15:253. 1908.

Pteris palmata Willd. Sp. Pl. ed. 4, 5:357. 1810. TYPE: Caracas, Distr. Fed., Venezuela, Bredemeyer (B-Hb. Willd. 19957 not seen Tryon photo).

Pteris pedata var. *gemmipara* Sodiro, Anales Univ. Quito 8(55): 68 (repr. 99). 1893. TYPE: Río Guallabamba near Los Reales, Pcia. Pichincha, Ecuador, 1600–1800 m, Sodiro (Hb. Sodiro not seen).

Doryopteris mayoris Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:51, t. 2, f. 2. 1912. TYPE: Medellín, Depto. Antioquia, Colombia, Mayor 180 (S not seen; isotype US).

Plants terrestrial, at 100–1900 m elevation, in forests and on roadside banks, from the upper Río Reventazón valley (Pcia. Cartago), Cerro Tablazo, the vicinity of S. Isidro del General, above Cañazas and La Yeguada (Pcia. Veraguas), and Barro Colorado Island (Canal Zone). Also from Mexico, Nicaragua, Venezuela, and Colombia to Bolivia.

25. ANOGRAMMA Link

Plants terrestrial or epipetric, often on banks among mosses or on wet rocks in or near streams and waterfalls; rhizomes small or obsolete, erect, hairy and/or scaly, the trichomes tan to brown; fronds small to minute, stipes thin, darkened at the base, sparsely scaly; laminae 3-pinnate, oblong-lanceolate, membranaceous, glabrous, rather finely divided, the ultimate segments narrowly oblanceolate to linear, sometimes cleft at the apex, plane; veins free, simple, obvious; sori elongate, lateral on the veins near the apex; sporangia short-stalked.

Subtropical to tropical regions of both hemispheres, but absent from North America north of Mexico; 6 species.

TRYON, R. 1962. Taxonomic fern notes. II. *Pityrogramma* (including *Trismeria*) and *Anogramma*. Contr. Gray Herb. 189:52–76.

163. *Anogramma leptophylla* (L.) Link, Fil. Sp. 137. 1841.

Polypodium leptophyllum L. Sp. Pl. 2:1092. 1753. LECTOTYPE: A specimen labelled “heterophyllum 46” in the hand of Linnaeus, annotated “leptophyllum” by J. E. Smith (LINN 1251.56 not seen microfiche S. I. Library), chosen by Morton (Amer. Fern J. 60:101–103. 1970).

Gymnogramma leptophylla var. *mexicana* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:27. 1842. TYPE: Mirador, Edo. Veracruz, Mexico, Galeotti 6294 (BR not seen photo 5136).

Gymnogramma chaerophylla var. *cryptogrammoides* Bommer in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 234. 1896. TYPE: Cerro du Durazno, Irazú Massif, Pcia. Cartago, 2200 m, Pittier 637 (BR not seen; isotype CR).

Pityrogramma guatemalensis Domin, Spisy Přír. Fak. Karlovy Univ. 88:9. 1928. TYPE: [Volcán] Fuego, Guatemala, Salvin & Godman 172 (PRC? not seen; isotypes K not seen Tryon photo, US).

FIGS. 159–173. *Pellaea*, *Doryopteris*, *Anogramma*, and *Pityrogramma*. FIG. 159. Basal pinnules of median pinna of *P. ovata*, Valerio 196. FIG. 160. Basal pinnules of median pinna of *P. skinneri*, Chaves 8, Nicaragua. FIG. 161. Plant of *P. temifolia*, Howard 82, Nicaragua. FIG. 162. Sterile and fertile fronds of *D. pedata* var. *palmata*, Standley 41475. FIG. 163. Plant of *A. leptophylla*, Valerio 244. FIG. 165. Median pinna of *P. calomelanos* var. *calomelanos*, Skutch 4382. FIG. 166. Frond of *P. chrysocoma*, Lehmann 3673, Colombia. FIG. 167. Median pinna of *P. dealbata*, Elmore H49. FIG. 168. Median pinnule of *P. dukei*, Duke 11200. FIG. 170. Median pinna of *P. ebenea* var. *ebenea*, Wercklé. FIG. 171. Subbasal pinna of *P. ferruginea*, Maxon 4974. FIG. 172. Pinnule of *P. pearcei*, Mayor 144, Colombia. FIG. 173. Median pinna of *P. trifoliata*, Skutch 2295.

Plants terrestrial, at 600–2900 m elevation, on banks and slopes, often among mosses, from the Cordillera Central, the Meseta Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico, Guatemala, El Salvador, Nicaragua, and Peru to southern Brazil.

26. PITYROGRAMMA Link

Plants terrestrial, often somewhat weedy, common on roadside banks; rhizomes erect to ascending, scaly, the scales narrowly lanceolate, concolorous, tan to brown, the margins entire; fronds medium- or large-sized; stipes brown to atropurpureous, shiny, scaly at the base, usually sulcate; rachises resembling the stipes in color; laminae 1–3-pinnate, usually lanceolate, firmly herbaceous to subcoriaceous, slightly to more usually copiously farinose on the abaxial surface, the farina usually white or yellow, or pubescent in a few species; pinnae usually narrowly lanceate, equilateral (the basal ones inequilateral in a few species), the ultimate segments triangular to elongate, nearly plane, not revolute; veins free, forked, hidden within the lamina tissue; indusia absent; sori elongate, irregular, lateral on the veins near the apex; sporangia short-stalked.

Mostly New World tropics, but widely naturalized in the Old World tropics; ca. 15 species.

TRYON, R. 1962. Taxonomic fern notes. II. Pityrogramma (including Trismeria) and Anogramma. Contr. Gray Herb. 189:52–76.

1. Pinnae palmate with usually (2)3(7) lobes. Fronds up to 1.5 m long; stipes and rachises atropurpureous; laminae linear, slightly dimorphic, the sterile pinnules linear, entire, 2–12 cm long, ca. 1 cm wide, often with a pale yellow farina on the abaxial surface, the fertile pinnules laterally contracted.

173. *P. trifoliata*

1. Pinnae pinnate, the lateral lobes or pinnules many..2.

2(1). Rachises and costae densely lanate abaxially, the hairs stramineous, with obvious cross-walls. Fronds up to 1 m long; stipes and rachises atropurpureous, the surface often hidden by the abundant hairs; laminae lanceate, up to 25 cm wide, pinnate-pinnatifid to 2-pinnate, the pinnae linear-lanceolate, the pinnules or segments up to 1 cm long, 4 mm wide.

171. *P. ferruginea*

2(1). Rachises and costae glabrous or glabrescent at maturity, usually farinose abaxially..3.

3(2). Scales small, generally inconspicuous on the rhizome and stipe bases, their apices long, thin, one cell wide..6.

3(2). Scales large, conspicuous on the rhizome and stipe bases, several cells wide nearly to their apices..4.

4(3). Laminae with white farina, coriaceous, 2-pinnate or 2-pinnate-pinnatifid; ultimate segments wide, with several veins. Fronds 20–35 cm long; stipes sulcate, atropurpureous at the base, tan to stramineous distally; laminae broadly lanceolate, 10–25 cm long, 8–15 cm wide, coriaceous, the segments often revolute.

166. *P. chrysoconia*

4(3). Laminae with yellow farina or not farinose, papyraceous, 3-pinnate or more compound; ultimate segments narrow, with 1 or 2(3) veins..5.

5(4). Laminae not farinose; ultimate segments with 1 vein. Stipes 10–20 cm long; laminae ovate-lanceolate to deltate, 10–25 cm long, 5–25 cm wide.

172. *P. pearcei*

5(4). Laminae usually with yellow or white farina; ultimate segments with 1 or 2(3) veins. Stipes 14–31 cm long; laminae deltate to nearly triangular, 15–21 cm long, (7)11–20 cm wide.

168. *P. dukei*

6(3). Ultimate segments obovate or oval; small fronds 2-pinnate-pinnatifid; large fronds 3-pinnate or 3-pinnate-pinnatifid. Stipes 8–38 cm long; laminae narrowly lanceate to ovate-lanceolate, 9–33 cm long, 6–20 cm wide.

167. *P. dealbata*

6(3). Ultimate segments elliptical, lanceolate, lanceate, deltate, or oblong; small fronds pinnate-pinnatifid to 2-pinnate at the base; large fronds 2–3-pinnate..7.

7(6). Pinnules or ultimate segments and subapical pinnae at right angles to their axes, obtusely lobed or pinnatifid, obtuse or blunt at the apex; basal and suprabasal pinnae inequilateral, basiscopically developed. Fronds 10–60(75) cm long, 2.5–20(30) cm wide, linear to lanceate, pinnate-pinnatifid to 2-pinnate-pinnatifid..9.

7(6). Pinnules or ultimate segments and subapical pinnae oblique to their axes, serrate or acutely pinnatifid, acute at the apex; basal and suprabasal pinnae equilateral. Fronds 4–50(75) cm long, 8–20(30) cm wide, narrowly to broadly lanceolate, 2-pinnate to 3-pinnate-pinnatifid..8.

8(7). Farina white, pale yellow, or nearly absent.

165. *P. calomelanos* var. *calomelanos*

8(7). Farina brilliant yellow, rarely orangish.

164. *P. calomelanos* var. *aureoflava*

9(7). Farina white.

170. *P. ebenea* var. *ebenea*

9(7). Farina brilliant yellow.

169. *P. ebenea* var. *aurata*

164. *Pityrogramma calomelanos* var. *aureoflava* (Hook.) Weath. ex Bailey, Man. Cult. Pl. 64. 1924.

Gymnogramma calomelanos var. *aureoflava* Hook. Gard. Ferns t. 50 text. 1862. LECTOTYPE: Ecuador, *Seeman* 948 (K not seen), chosen by Tryon (Contr. Gray Herb. 189:61. 1962).

Pityrogramma austroamericana Domin, Kew Bull. 1929:221. 1929. LECTOTYPE: Challapampa, Depto. Oruro, Bolivia, 2550–2700 m, *Mandon* 1549bis (K not seen Tryon photo not seen; isotype GH not seen).

Pityrogramma hybrida var. *broadwayana* Domin, Rozpr. České Akad. Věd. Tr. II, Vědy Mat. Přír. 51(15):3. 1941. TYPE: Cultivated at the St. Clair Experiment Station, Trinidad, *Broadway* 4678 (US; probable isotype NY not seen).

Plants terrestrial, at 0–1400 m elevation, along roads and trails, from the adjacent lowlands, foothills, and slopes of the Cordillera de Tilarán, the Cordillera Central, and the northern end of the Cordillera de Talamanca. Also from Honduras, Nicaragua, Venezuela, Ecuador to Bolivia, Brazil, and Argentina.

F. R. Fosberg (pers. comm.) has pointed out that Bailey always suppressed parenthetical authors in order to avoid imposing on those who had to write out the names adopted in his book. His citation of “var. *aureoflava* Weatherby” is not clearly a transfer of Hooker’s name, but Weatherby gives the intended citation in full in the Gray Herbarium Card Index.

165. *Pityrogramma calomelanos* (L.) Link, Handb. 3:20. 1833, var. *calomelanos*.

Acrostichum calomelanos L. Sp. Pl. 2:1072. 1753. TYPE: A specimen, locality and collector unknown, labelled “24 Acrostic. calomelanos” in the hand of Linnaeus (LINN 1245.19 not seen microfiche S. I. Library).

Gymnogramma bidentata K. Presl, Reliq. Haenk. 1:18, t. 2, f. 3. 1825. TYPE: Panama, *Haenke* (PRC not seen), synonymized by Tryon (Contr. Gray Herb. 189:60. 1962).

?*Ceropteris serrata* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:81. 1857. TYPE: Orizaba, Edo. Veracruz, Mexico, *Schaffner* 162 (P or RB not seen).

Gymnogramma calomelanos var. *denudata* Harr. J. Linn. Soc., Bot. 16:37. 1877. TYPE: Pebas, Pcia. Loreto, Peru, *Steere* (MICH not seen; isotype K not seen Tryon photo not seen), examined by Price (Contr. Univ. Michigan Herb. 15:203–204. 1982).

Acrostichum album Vell. Fl. Flumin. 11:t. 91. 1831; Arq. Mus. Nac. Rio de Janeiro 5:453. 1881. TYPE: t. 91, which is based on a collection made by Vellozo from around Rio de Janeiro, Brazil.

Ceropteris calomelanos var. *gracilis* Hieron. Hedwigia 48:222. 1909. TYPE: Near Coetando on road between La Plata and Mt. Huila, Depto. Huila, Colombia, 1700 m, *Stuebel* 1271 (B not seen).

Pityrogramma chamaesorus Domin, Spisy Přír. Fak. Karlovy Univ. 88:6. 1928. TYPE: Guyana, *Schomburgk* 390 (K not seen Tryon photo not seen).

Pityrogramma calomelanos f. *máior* Domin, Rozpr. České Akad. Věd. Tř. II, Vědy Mat. Přír. 51(18):11. 1941. TYPE: Antahuacana, Depto. Cochabamba, Bolivia, 750 m, *Buchtien* 2182 (US).

Pityrogramma calomelanos var. *subintegra* Domin, Rozpr. České Akad. Věd. Tř. II, Vědy Mat. Přír. 51(18):11. 1941. TYPE: Antahuacana, Depto. Cochabamba, Bolivia, 750 m, *Buchtien* 2181 (US).

Pityrogramma calomelanos var. *ochrophylla* Domin, Rozpr. České Akad. Věd. Tř. II, Vědy Mat. Přír. 51(18):12. 1941. SYNTYPES: Riverside to Minas, Pcia. Camagüey, Cuba, *Shafer* 1174 (K not seen); and The Pinales, SE of Paso Estancia, Pcia. Oriente, Cuba, *Shafer* 1749 (K not seen; isosynotype US).

Pityrogramma calomelanos var. *venezuelae* Domin, Rozpr. České Akad. Věd. Tř. II, Vědy Mat. Přír. 51(18):12. 1941. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Fendler* 298 (K not seen; isotype US).

Pityrogramma martinicensis Domin, Vestn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15): 1. 1942. TYPE: Martinique, *Duss* 1509 (US).

Plants terrestrial, at 0–1400(2000) m elevation, often on river and roadside banks, from throughout the Flora area. Also from throughout tropical America, including Florida.

See *P. trifoliata* for a discussion of hybrids between it and this variety.

166. *Pityrogramma chrysoconia* (Desv.) Maxon ex Domin, Spisy Přír. Fak. Karlovy Univ. 88:10. 1928.

Acrostichum chrysoconium Desv. Mém. Soc. Linn. Paris 6:212. 1827. TYPE: Huasahuas [Huasahuasi?], Depto. Junín, Peru, *Dombey* (P not seen Cintract photo; isotypes B not seen Tryon photo, fragm US).

Gymnogramma guianensis Klotzsch, Linnaea 20:412. 1847. TYPE: Guyana, *Rich. Schomburgk* 1154 (B not seen Tryon photo not seen fragm NY; isotype K not seen fragm NY not seen).

Gymnogramma ornithopteris Klotzsch, Linnaea 20:413. 1847. TYPE: Páramo de Mucuches, Edo. Mérida, Venezuela, *Moritz* 288 (B not seen Tryon photo fragm US; isotype K not seen Tryon photo).

Gymnogramma flexilis Klotzsch, Linnaea 20:414. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz* 287 (B not seen; isotype K not seen fragm NY).

Allosorus farinosus Kunze, Farrnkräuter 2:5, t. 103. 1848, non K. Presl, 1836, nom. illeg. et superfl. TYPE: A renaming of *Gymnogramma ornithopteris* Klotzsch, and so based on the type of that name.

Ceropteris obtusa Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:80. 1857. TYPE: “Province Rio de la Hacha” Sierra Nevada, Comis. La Guajira, Colombia, *Schlim* 873 (P or RB not seen; isotype P not seen Tryon photo not seen).

Gymnogramme tartarea var. *pallidipes* Hook. Sp. Fil. 5:149. 1864. TYPE: Not stated.

Pityrogramma subnivalis Domin, Spisy Přír. Fak. Karlovy Univ. 88:5. 1928. TYPE: Santa Marta, Depto. Magdalena, Colombia, *Purdie* in 1844 (K not seen Tryon photo fragm NY).

Pityrogramma ornithopteris f. *seminigripes* Domin, Lilloa 2:32. 1938. TYPE: Ecuador, *Sodi* 352 in 1871 (K not seen).

Pityrogramma ornithopteris f. *elatio*r Domin, Lilloa 2:33. 1938. TYPE: Vicinity of Vetás, Depto. Santander, Colombia, 3100–3250 m, *Killip & Smith* 17912 (US).

Pityrogramma ornithopteris f. *denudata* Domin, Lilloa 2:33. 1938. TYPE: Colombia, *Purdie* (K not seen).

Pityrogramma ornithopteris var. *decomposita* Domin, Lilloa 2:34. 1938. TYPE: Near Facatativá, Depto. Cundinamarca, Colombia, *Ariste-Joseph A400* (US), cited by Domin as *A400bis*, to distinguish it from another sheet of *A400*.

Pityrogramma ornithopteris var. *sanctae-martae* Domin, Lilloa 2:34. 1938. TYPE: Santa Marta, Depto. Magdalena, Colombia, *Smith 1061* (US).

Plants terrestrial, at 2000?–3400 m elevation, in the Flora area known only from along the Interamerican Highway between Cartago and S. Isidro del General (*Scamman 6085*, GH) and the summit of Volcán Chiriquí (*Maxon 5356*, US). Also from Jamaica, Venezuela to Bolivia, and Guyana.

The fronds of this species may resemble white farinose fronds of *P. ebenea* var. *ebenea*, but the stipes are atropurpureous only at the base in *P. chrysoconia* and not throughout, as they are in *P. ebenea*.

167. *Pityrogramma dealbata* (K. Presl) Domin, Rozpr. České Akad. Věd. Tř. II, Vědy Mat. Přír. 51(15):7. 1941.

Gymnogramma dealbata K. Presl, Reliq. Haenk. 1:18, t. 3, f. 1. 1825. LECTOTYPE: Panama, *Haenke* (PRC 24358a not seen Prague photo), chosen by Tryon (Contr. Gray Herb. 189:67. 1962).

Ceropteris schaffneri Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:80. 1857. SYNTYPES: Near Orizaba, Edo. Veracruz, Mexico, *Schaffner 165a* and *165b* (P or RB neither seen).

?*Ceropteris plicata* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:81. 1857. TYPE: Near Tolutla [Totutla], Edo. Veracruz, Mexico, *Schaffner 164* (P or RB not seen).

Plants terrestrial or epipetric, at 0–1100(1600) m elevation, on cliffs, road cuts, and river banks, from Pta. Guapilol and Isla de Caño (Pcia. Puntarenas), the slopes of the Cordillera Central and the Fila de Cedral, and the Pacific slopes and lowlands of west-central Panama. Also from Mexico to Nicaragua.

Young, sterile fronds of this species, in which the ultimate segments have not yet contracted to their final shape, may be confused with fronds of *P. calomelanos* var. *calomelanos*.

168. *Pityrogramma dukei* Lellinger, Proc. Biol. Soc. Wash. 89:721, f. 4. 1977.

TYPE: Near the Río Truando, 3–5 km above the airport at La Teresita, Depto. Chocó, *Duke 11200* (US; isotype NY).

Plants terrestrial, at 0–100 m elevation, in disturbed areas along roads and trails, from the northern half of the Depto. Chocó.

This species is most closely related to *P. pearcei*. It is now known to bear white, as well as brilliant yellow, farina.

169. *Pityrogramma ebenea* var. *aurata* (T. Moore) Lellinger, Proc. Biol. Soc. Wash. 98:387. 1985.

Gymnogramma tartarea var. *aurata* T. Moore, Gard. Chron. 1870(15):493. 1870. TYPE: Cultivated by Veitch, originally from Peru (not seen); Tryon (Contr. Gray Herb. 189:66. 1962) noted that Peru, *Pearce 218* (K not seen photo GH not seen) is authentic, and may be the type.

Pityrogramma praestantissima Domin, Spisy Přír. Fak. Karlovy Univ. 88:6. 1928. TYPE: Depto. Antioquia, Colombia, *Kalbreyer 1909* (K not seen photo GH not seen).

Pityrogramma presliana Domin, Spisy Přír. Fak. Karlovy Univ. 88:6. 1928. TYPE: Peru, *Mathews 1823* (K not seen photo GH not seen).

Pityrogramma presliana Domin, Spisy Přír. Fak. Karlovy Univ. 88:6. 1928. TYPE: Peru, *Mathews* 1823 (K not seen photo GH not seen).

Pityrogramma presliana var. *herzogii* Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15):3. 1942. TYPE: Tres Cruces, Cordillera de Sta. Cruz, Depto. Sta. Cruz, Bolivia, 1500 m, *Herzog* 1532 (US).

Pityrogramma galapagoensis Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15):4. 1942. TYPE: Bindloe Island, Galápagos Islands, Ecuador, *Snodgrass & Heller* 782 (US).

Plants terrestrial, at 2500–3000 m elevation, on roadside banks, in the Flora area known only from the Cerro de la Muerte, Pcia. S. José (*Gómez* 6759, CR) and from Providencia de Copey, Pcia. S. José (*Gómez* 6715, CR). Also from Colombia, the Galápagos Islands, and Ecuador to Argentina.

170. *Pityrogramma ebenea* (L.) Proctor, Brit. Fern Gaz. 9:219. 1965, var. *ebenea*.

Acrostichum ebeneum L. Sp. Pl. 2:1071. 1753. LECTOTYPE: A specimen, locality and collector unknown, labelled “*Acrostichum* 20 *ebeneum*” in the hand of Linnaeus (LINN 1245.14 not seen microfiche S. I. Library), chosen by Proctor (Brit. Fern Gaz. 9:219. 1965).

Acrostichum tartareum Cav. Descr. Pl. 242. 1801. TYPE: Near Guamantanga, Depto. Lima, Peru, *Née* (MA not seen fragm B-Hb. Willd. 19568-3 not seen Tryon photo).

Hemionitis dealbata Willd. Sp. Pl. ed. 4, 5:131. 1810, nom. superfl. TYPE: A renaming of *Acrostichum tartareum* Cav., and so based on the type of that name.

Gymnogramma peruviana Desv. Ges. Naturf. Freunde Berlin Mag. 5:329. 1811. TYPE: Peru, *J. de Jussieu* (P-Hb. Juss. 1009 not seen Cintract photo).

Ceropteris pallescens Fée, Cat. Foug. Mex. [Mém. Foug. 9]: 14. 1857, nom. nud. TYPE: Valley of Orizaba, Edo. Veracruz, Mexico, *Schaffner* 159 (P or RB not seen).

Ceropteris stuebelii Hieron. Hedwigia 48:223, t. 10, f. 9. 1909. TYPE: Near Ibagué, Depto. Tolima, Colombia, *Stuebel* 12 (B not seen fragm US; isotype GH).

Pityrogramma tripinnata Domin, Spisy Přír. Fak. Karlovy Univ. 88:7. 1928. TYPE: Region of S. Luis Potosí, Edo. S. Luis Potosí, Mexico, *Parry & Palmer* 1004 (K not seen Tryon photo; isotype US).

Pityrogramma angibua Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15): 3. 1942. TYPE: Laguna de Chiriquí and vicinity, Pcia. Bocas del Toro, *Hart* 24 (US). This is said by Domin to be a hybrid, but is more likely just a highly divided form of *P. tartarea*.

?*Pityrogramma tartarea* var. *mathewsii* Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15):6. 1942. TYPE: Quebrada de Pariahuanca, Colombia, *Mathews* 970 (K not seen).

?*Pityrogramma tartarea* var. *kalbreyeri* Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15):6. 1942. TYPE: Ocaña, Depto. Norte de Santander, Colombia, 5000 ft, *Kalbreyer* 341 (K not seen).

?*Pityrogramma tartarea* var. *pteridoides* Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15):7. 1942. SYNTYPES: Edo. Chiapas, Mexico, *Ghiesbreght Fil. Austro-Mex.* 276 (K not seen); and Mexico, *Graham* 408 in 1830 (K not seen).

?*Pityrogramma tartarea* var. *delicatula* Domin, Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír. 1941(15):7. 1942. TYPE: Loja, Pcia. Loja, Ecuador, collector unknown (K not seen).

Plants terrestrial or rarely epipetric, at 0–2700(3200) m elevation, in forests and open areas, often on roadside banks, from the Cordillera Central, the Meseta Central, the Fila de Cedral, the Cordillera de Talamanca, the Canal Zone, and near Quibdó (Depto. Chocó). Also from the Greater Antilles, Mexico to Nicaragua, Venezuela to Bolivia, and Brazil.

171. *Pityrogramma ferruginea* (Kunze) Maxon, Contr. U. S. Natl. Herb. 17:173. 1913.

Pityrogramma lanata Klotzsch ex A. Braun, App. Ind. Sem. Hort. Berol. 17. 1854. TYPE: Cultivated in the garden at Berlin, originally from Pcia. Veraguas, Panama, *Warscewicz* (presumably B not seen).

Gymnogramma bommeri Christ in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 237. 1896. SYNTYPES: Between the Llanuras de S. Carlos and the Cuesta de la Vieja, Pcia. Heredia, 750 m, *Biolley 1066* (BR not seen); and Carrillo, Pcia. S. José, 300 m, *Pittier 1169* (BR not seen).

Plants terrestrial, along road and river banks, at 100–2000 m elevation, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and the Fila Costeña near S. Vito. Also from Guatemala, El Salvador, Nicaragua, and Peru.

172. *Pityrogramma pearcei* (T. Moore) Domin, Spisy Přír. Fak. Karlovy Univ. 88:9. 1928.

Gymnogramma pearcei T. Moore, Gard. Chron. 1864:340. 1864. TYPE: Cultivated by Veitch from Andean specimens collected by Pearce, according to Tryon (Contr. Gray Herb. 189:73. 1962), who provided details of the authentic material (K not seen).

Gymnogramma decomposita Baker, Gard. Chron. 1872:1587. 1872. TYPE: Cultivated by Veitch from Andean specimens [probably collected by Pearce], according to Tryon (Contr. Gray Herb. 189:73. 1962), who provided details of the authentic material (K not seen Tryon photo).

Gymnogramma elegantissima Pynaert, Rev. Hort. Belge Etrangère 15:211. 1898, non Bull, 1889, nom. illeg. TYPE: Unknown.

Gymnogramma fumarioides Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:45, t. 6, f. 10. 1912. TYPE: Lake above Medellín, Depto. Antioquia, Colombia, *Mayor 144* (S not seen; isotypes P not seen Tryon photo, US).

Plants terrestrial along streams in open areas, at 1200–1500 m elevation, from Tapantí and Cerro Colorado 20–28 mi from S. Felix (Pcia. Chiriquí). Also from Colombia.

173. *Pityrogramma trifoliata* (L.) Tryon, Contr. Gray Herb. 189:68. 1962.

Acrostichum trifoliatum L. Sp. Pl. 2:1070. 1753. LECTOTYPE: Presumably t. 45, f. 2 of Sloane's "Voyage...." The description in Linnaeus' "Amoenitates" could not have been drawn from Sloane's description alone, but the decreasing division of the pinnae mentioned in the description in the "Amoenitates" is shown in Sloane's illustration. The specimen in the Linnaean Herbarium (LINN 1245.9 not seen microfiche S. I. Library) is labelled "*Acrostichum 15 trifoliatum*" in Linnaeus' hand. It might have been from Jamaica, received from Houstoun prior to 1753, in which case it should be the lectotype. According to Jackson's "Index," however, it and LINN 1245.10, to which 1245.9 is pinned, were not present in the Linnaean herbarium in 1753, but were present in 1767.

Trismeria argentea Fée, Gen. Fil. [Mém. Foug. 5]:165, t. 14A, f. 1. 1852. SYNTYPES: Caracas, Distr. Fed., Venezuela, *Mořitz* (P or RB not seen); and Est. Minas Gerais, Brazil, *Pohl* (P or RB not seen).

Trismeria aurea Fée, Gen. Fil. [Mém. Foug. 5]:165. 1852, nom. superfl. TYPE: A renaming of *Acrostichum trifoliatum* L., and so based on the type of that name.

Trismeria microphylla Fée, Gen. Fil. [Mém. Foug. 5]:165. 1852. TYPE LOCALITY: Peru.

Plants terrestrial, at 0–1800 m elevation, along rivers and roadsides in disturbed areas, from the Cordillera de Tilarán, the Cordillera Central, Cerro Tablazo, the Cordillera de Talamanca to Pcia. Chiriquí, the Peninsula de Burica (Pcia. Chiriquí), and the Río Yape (Pcia. Darién). Also from Florida, the Greater Antilles, Mexico to Nicaragua, Venezuela to Bolivia, Brazil, Paraguay, Argentina, and Chile.

This species is known to hybridize with *P. ferruginea* and with several varieties of *P. calomelanos*, but only the hybrid with var. *calomelanos* has been found as yet in

the Flora area, from the Río Pejivalle, Pcia. Cartago (Gómez 6788, CR), and from road banks 4 km before the bridge over the Río Pacuarito, Pcia. Limón (Gómez 6805, CR). Gómez and Wollenweber (Amer. Fern J. 68:121. 1978) have shown that Costa Rican material of this species is variable in pinna division, with simple and bipartite pinnae as or more common than tripartite pinnae.

27. HEMIONITIS L.

Plants terrestrial or occasionally epipetric, often on banks or cliffs; rhizomes short-creeping to erect, scaly, the scales narrowly lanceate with a long, hair-like apex, concolorous, tan, thin, the margins entire; fronds small- to medium-sized, monomorphic or slightly dimorphic with a basal rosette of sterile fronds and taller, upright fertile fronds; stipes atropurpureous, shiny, scaly and pilose, especially at the base, the hairs tan, multicellular; laminae lobed, usually pentagonal, herbaceous, with the color of the stipe extending into the midribs of the lamina lobes, slightly pilose on both surfaces, the hairs thin, straight, tan, multicellular with the walls of adjoining cells obvious and sometimes dark in color; lamina lobes blunt to elongate, the basal pair usually bearing a single, basispic lobe, entire to broadly crenate, plane at the margin; venation of elongate areolae lacking free included veinlets; indusia absent; sporangia scattered along the veins, short-stalked.

Central America and the West Indies; 7 species.

MICKEL, J. T. 1974. A redefinition of the genus *Hemionitis*. Amer. Fern J. 64:3–12.

1. Laminae broadly ovate to nearly round in outline, entire, scarcely lobed, with linear hairs 1- or 2-celled distal to the slightly bulbous base, the articulations pale and inconspicuous. Stipes 1.5–7 cm long; laminae 1–4 cm long, 1–4 cm wide.

174. *H. levyi*

1. Laminae more or less pentagonal in outline, mostly shallowly to deeply crenate, deeply lobed, with acicular hairs 2–5-celled distal to the bulbous base, the articulations dark and conspicuous..2.

2(1). Laminae with a single lateral pair of lobes each usually having a single basispic lobe; fertile lamina margins usually deeply crenate. Fertile stipes 2.5–10 cm long; laminae 2.5–10 cm long, 2–14 cm wide.

175. *H. palmata*

2(1). Laminae with usually 2 lateral pairs of lobes, the basal lobes each usually having a single basispic lobe; fertile lamina margins shallowly crenate to entire. Fertile stipes 1–4 cm long; laminae 3–10 cm long, 2–13 cm wide.

176. *H. pinnatifida*

174. *Hemionitis levyi* Fourn. Bull. Soc. Bot. France 17:237. 1870.

Hemionitis otonis Maxon, Contr. U. S. Natl. Herb. 17:171. 1913. TYPE: Along road from Ojo de Agua to Brasil (Santa Ana), Pcia. S. José, ca. 800 m, O. Jiménez 333 (US).

TYPE: Isla de Omotepe, Depto. Rivas, Nicaragua, 40 m, Lévy 1197 (P not seen; isotypes HBG not seen photo 5536, US).

Plants terrestrial, at ca. 800 m elevation, in rocky places, in the Flora area known only from the type of *H. otonis* and from Garrobillas, Canton Puriscal, Pcia. S. José (Gómez 617, CR). Also from Mexico, El Salvador and Nicaragua.

175. *Hemionitis palmata* L. Sp. Pl. 2:1077. 1753.

LECTOTYPE: Plate 33, f. 1 of Plumier's "Description...", which is based on a specimen collected by Plumier on Martinique, chosen by Proctor (Ferns Jamaica 213.1985). The specimen of this species annotated by Linnaeus (LINN 1248.3 not

seen microfiche S. I. Library) was not in the Linnaean Herbarium prior to 1756, according to Jackson's "Index," and so cannot be the type.

Plants terrestrial, at 500–1900 m elevation, on roadside banks and in pastures, from the Peninsula de Nicoya, the vicinity of S. Ramón, the Atlantic coastal plain of northern Costa Rica, the upper Río Reventazón valley, and the upper Río General valley. Also from the Antilles, Mexico to Nicaragua, Trinidad, Venezuela, Colombia, Peru, Bolivia, Surinam, and Brazil.

176. *Hemionitis pinnatifida* Baker, Syn. Fil. 399. 1868.

TYPE: Central America [presumably Costa Rica], *Wendland 438* (presumably K not seen).

Plants terrestrial, at ca. 1000 m elevation, in rocky places, in the Flora area known only from Garrotillos, Canton Puriscal, Pcia. S. José (*Gómez 617*, CR, a mixed collection also containing *H. levyi*). Also from Mexico to Nicaragua.

Although both this species and *H. palmata* are dimorphic, with longer fertile fronds, *H. pinnatifida* shows incomplete dimorphism occasionally, with one or more of the usually sterile rosette leaves partially or entirely fertile.

28. GYMNOPTERIS Bernh.

Plants terrestrial; rhizomes short-creeping to erect, scaly, the scales linear-lanceate with a long, hair-like apex, bicolorous, tan with a blackish central stripe, the margins entire; fronds medium-sized, monomorphic; stipes stramineous, castaneous, or atropurpureous and shiny, scaly and pilose or pilose and pilosulous, the scales linear, tan, entire, the large hairs straight, tan, multicellular, with the wall of adjoining cells obvious, the small hairs apparently unicellular, acicular, minute, tan; laminae 1–2-pinnate, deltate to oblong, the pinnae ovate-lanceolate, herbaceous, short-stalked, the margins entire, slightly hairy on both surfaces, the hairs thin, straight, tan, multicellular with the walls of adjoining cells obvious and sometimes dark in color; venation free or areolate with free veins at the margins, the areolae elongate, lacking free included veinlets; indusia absent; sporangia scattered along the veins, short-stalked.

Tropical America and Asia; 5 species.

LELLINGER, D. B. 1969. The taxonomic position of *Coniogramme americana*. *Amer. Fern J.* 59:61–65.

MICKEL, J. T. 1974. A redefinition of the genus *Hemionitis*. *Amer. Fern J.* 64:3–12.

1. Venation entirely free; stipes and rachises castaneous to atropurpureous. Laminae oblong, pinnate, 20–40 cm long, 4.5–14 cm wide; lateral pinnae 6–12 pairs, ovate-lanceolate to oblong, equilateral at the base, abruptly acute to cuneate at the apex, 2–8 cm long, 1–2.5 cm wide; spores tuberculate.

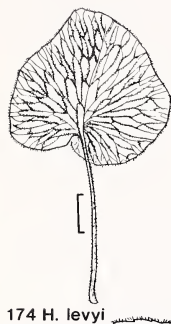
177. *G. rufa*

1. Venation partially areolate, free only at the margins; stipes and rachises stramineous. Laminae deltate to lanceate, pinnate or rarely pinnate-pinnatifid or 2-pinnate, 7–23 cm long, 6.5–18 cm wide; lateral pinnae 1–6 pairs, ovate-lanceolate, slightly inequilateral at the base, gradually acute to cuneate at the apex, 4–10 cm long, 2–4.5 cm wide; spores cristate.

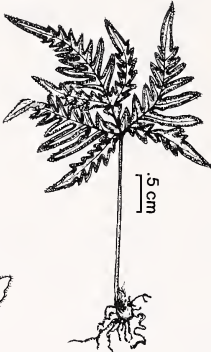
178. *G. subcordata*

177. *Gymnopteris rufa* (L.) Bernh. ex Underw. Bull. Torrey Bot. Club 29:627. 1902.

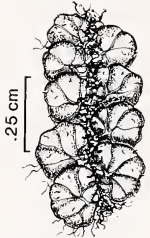
Pteris rufa L. Sp. Pl. 2:1074. 1753, as "*ruffa*." LECTOTYPE: Plate 45, fig. 1 of Sloane's "Voyage...", chosen by Linnaeus (Syst. Nat. ed. 10, 2:1320. 1759).



174 *H. levyi*



179 *B. pedata*



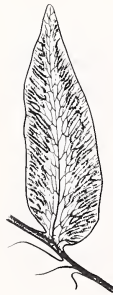
180 *J. alstonii*



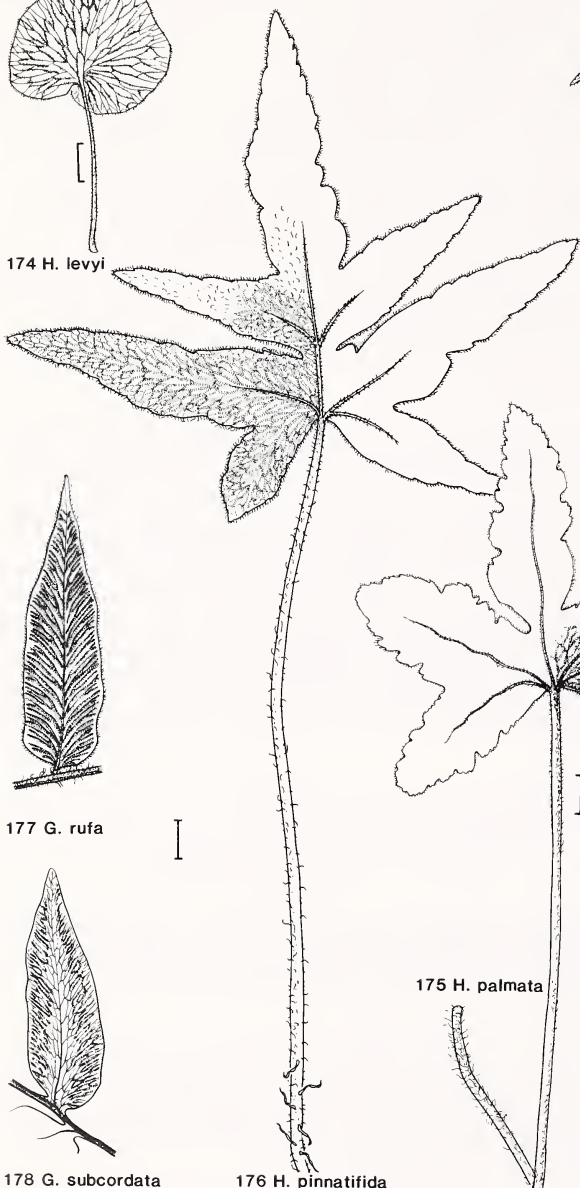
182 *J. scammanae*



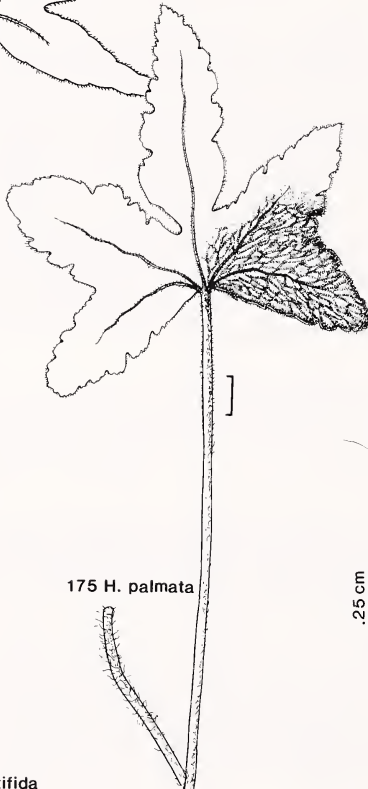
177 *G. rufa*



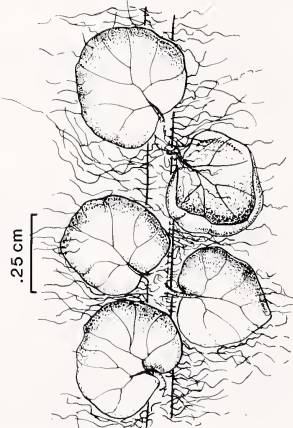
178 *G. subcordata*



176 *H. pinnatifida*



175 *H. palmata*



181 *J. rotundifolia*

Plants terrestrial, at 0–400 m elevation, in forests, from the valley of the Río General and the slopes and coastal plain from near Puntarenas to Juan Díaz (Pcia. Panama). Also from Cuba, Jamaica, Mexico to Honduras, Nicaragua, Venezuela, Colombia, Ecuador, Peru, Surinam, and Brazil.

178. *Gymnopteris subcordata* (D. C. Eaton & Davenp. in Rose) Underw. Bull. Torrey Bot. Club 29:628. 1902.

Gymnogramme subcordata D. C. Eaton & Davenp. in Rose, Contr. U. S. Natl. Herb. 5:138, t. 16. 1897, non *Coniogramme subcordata* Copel., 1910. LECTOTYPE: Yamala, Edo. Sinaloa, Mexico, Palmer 1416 (US; isoelectotypes NY, UC neither seen), chosen by Mickel & Beitel (Mem. New York Bot. Gard. 46:209. 1988).

Coniogramme americana Maxon, Contr. U. S. Natl. Herb. 17:607. 1916. TYPE: A renaming of *Gymnogramma subcordata* D. C. Eaton & Davenp. in Rose, and so based on the type of that name.

Plants terrestrial, at ca. 500 m elevation, on shady banks, in the Flora area known only from above the old hotel plaza on Volcán Poás (*Gómez 3025*, Hb. Gómez) and from the valley of the Río General (*Gómez 255*, Hb. Gómez). Also from Mexico, Guatemala, and Nicaragua.

29. BOMMERIA Fourn. in Baill.

Plants epipetric or terrestrial; rhizomes short-creeping, branched, scaly, the scales narrowly lanceate, weakly bicolorous, dark brown with paler, reddish-brown margins, the margins entire; fronds small- to medium-sized; stipes much longer than the laminae, reddish-brown to dark brown or atropurpureous, rather shiny, scaly at the base, subterete; laminae pentagonal, subternate, the basal pinnae strongly basiscopically developed, bipinnatifid proximally, bipinnatifid or pinnatifid distally, herbaceous, pilose on both surfaces and on the rachis or midrib, especially abaxially, the hairs pluricellular with obscure cross-walls, rather stiff, pale tan or reddish-tan; veins free and forked or forming polygonal areolae lacking included veinlets; sori elongate, irregular, the sporangia lateral on the veins, especially near and at the plane or revolute segment margins; sporangia short-stalked.

Central America and adjacent United States; 4 species.

HAUFLER, C. R. 1979. A biosystematic revision of *Bommeria*. J. Arnold Arbor. 60:445–476.

179. *Bommeria pedata* (Swartz) Fourn. Bull. Soc. Bot. France 27:327. 1880.

Hemionitis pedata Swartz, Syn. Fil. 20, 209, t. 1, f. 3. 1806. TYPE: Without locality or collector, ex *Herb. Cavanilles* (presumably S not seen), perhaps collected by Née in Mexico, according to Haufler (1979, p. 471).

?*Gymnogramme pedata* var. *palmata* Kunze, Linnaea 13:130. 1839. TYPE: Barranca Teocelo, Edo. Veracruz, Mexico, Aug 1829, *Schiede* (presumably LZ destroyed).

FIGS. 174–182. *Hemionitis*, *Gymnopteris*, *Bommeria*, and *Jamesonia*. FIG. 174. Frond of *H. levyi*, Jiménez L. 333. FIG. 175. Frond of *H. palmata*, Scamman 6080. FIG. 176. Frond of *H. pinnatifida*, Maxon 7700, Nicaragua. FIG. 177. Median pinna of *G. rufa*, Pittier 5212. FIG. 178. Subapical pinna of *G. subcordata*, McVaugh 15925, Mexico. FIG. 179. Plant of *B. pedata*, Pringle 11781, Mexico. FIG. 180. Median portion of frond of *J. alstonii*, Lellinger 873. FIG. 181. Median portion of frond of *J. rotundifolia*, Williams 20044. FIG. 182. Median portion of frond of *J. scammanae*, Carpenter 289.

Plants epipetric, at 1400 m elevation, in sunny places, in the Flora area known only from Volcán Tenorio, Pcia. Guanacaste (Gómez 69867, CR). Also from Mexico, Guatemala, Honduras, El Salvador, and Nicaragua.

30. JAMESONIA Hook. & Grev.

Plants terrestrial in páramos and subpáramos; rhizomes short- to long-creeping, branched, bearing bristles or bristle-like hairs, these mostly dark brown, pluricellular, acicular, 1 cell wide distal to the base or throughout; fronds small- to medium-sized; stipes short, densely pilose, bristly at the base, terete, trigonous, or sulcate; laminae pinnate, linear, coriaceous, indeterminate, with a permanent, indeterminate crozier, the apex glutinous or protected by hairs; pinnae short-stalked, simple, imbricate, minute (mostly less than 1 cm long), round or slightly elongate, often villous abaxially, strongly revolute; veins free, forked, usually mostly hidden within the lamina tissue; sori elongate, lateral on the veins, exindusiate but protected by the revolute pinna margins; sporangia long-stalked.

Highlands of Central and South America, especially in the Andes; ca. 20 species.

TRYON, A. F. 1962. A monograph of the fern genus *Jamesonia*. Contr. Gray Herb. 191:109–197.

1. Pinnae 1–2 mm wide; laminae up to 3 mm wide; hairs on the rachis and abaxial surface of the pinnae shorter than the pinnae, the plants appearing nearly glabrous, even at the frond apex.

182. *J. scammanae*

1. Pinnae 2–9 mm wide; laminae 3–10 mm wide; hairs on the rachis and abaxial surface of the pinnae often longer than the pinnae, the plants obviously hairy, especially at the frond apex. 2.

2(1). Pinnae sparsely villous on the adaxial surface, especially near the pinna margins; pinnae (2)4–9 mm in diam., up to (2)3–5 mm distant, herbaceous; apical bud of the laminae with its hairs usually wider than the pinnae just proximal to the apex.

181. *J. rotundifolia*

2(1). Pinnae usually glabrous on the adaxial surface, occasionally very sparsely villous; pinnae 2–5 mm in diam., 2 mm distant, coriaceous; apical bud of the lamina with its hairs usually no wider than the pinnae just proximal to the apex.

180. *J. alstonii*

180. *Jamesonia alstonii* A. F. Tryon, Contr. Gray Herb. 191:168, f. 11. 1962.

TYPE: La Laguna, Cerro de la Torre, Los Farallones, Cordillera Occidental, Depto. del Valle, Colombia, 3500–3550 m, *Cuatrecasas* 21884 (GH not seen; isotypes COL not seen, US).

Plants terrestrial, at 3400–3800 m elevation, in páramos and subpáramos, from the Cerro de la Muerte and Cerro Chirripó. Also from Mexico, Guatemala, Nicaragua, and Colombia to Bolivia.

This species apparently hybridizes on the Cerro de las Vueltas with a species of *Eriosorus* (Gómez 686, CR).

181. *Jamesonia rotundifolia* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém Foug. 7]:41, t. 10, f. 3. 1857.

TYPE: Ocaña, Depto. Norte de Santander, Colombia, 3300 m, *Schlim* 363 (RB not seen; isotypes G not seen, K not seen, P not seen).

Plants terrestrial, at 3000–3500 m elevation, in páramos and subpáramos, from the Cerro de las Vueltas, the Cerro de la Muerte, and Cerro Chirripó. Also from Colombia to Peru.

182. *Jamesonia scammanae* A. F. Tryon, Contr. Gray Herb. 191:164, f. 9. 1962.

TYPE: Cerro de la Muerte, Pcia. Cartago?, *Scamman* 7929 (GH; isotype US).

Plants terrestrial, at 3000–3800 m elevation, in páramos and subpáramos, from the Cerro de las Vueltas, the Cerro de la Muerte, and Cerro Chirripó. Also from Colombia to Bolivia.

31. ERIOSORUS Fée

Plants terrestrial in montane and páramo areas; rhizomes short- to long-creeping, branched, bearing pluricellular hairs, bristles, or rarely scales; fronds medium- to large-sized, the larger ones indeterminate and scrambling; stipes commonly pilose or glandular, mostly castaneous to atropurpureous, terete or nearly so, at least at the base; laminae (1)2–3-pinnate, rhombic or lanceate to linear, herbaceous, in most species less than 10(20) cm wide; rachises similar to the stipes but more often glabrous or nearly so and sulcate, sometimes flexuous; ultimate segments orbicular, obovate, ovate, bifid, or narrowly elliptic, often pilose, plane or revolute; veins free, commonly forked, usually visible; sori exindusiate, elongate, lateral on especially the ultimate branches of the veins, sporangia short-stalked.

Middle to high elevations in the tropics of the New World, especially the Andes, and on a few Atlantic Islands; ca. 25 species.

TRYON, A. F. 1970. A monograph of the fern genus *Eriosorus*. Contr. Gray Herb. 200:54–174.

1. Fronds scandent or recumbent; rachises usually markedly flexuous; laminae up to ca. 2.5 m long; pinnae mostly 12–25 cm long..5.

1. Fronds erect; rachises not or only slightly flexuous; laminae 10–45(60) cm long; pinnae mostly (1)3–8 cm long..2.

2(1). Pinnae irregular, ca. 1 cm long, the ultimate segments almost bead-like.

188. *Eriosorus warscewiczii* × *Jamesonia scammanae*

2(1). Pinnae regular, usually 3–8 cm long, the ultimate segments not bead-like..3.

3(2). Rhizomes short-creeping, the stipes congested, long-villous; laminae long-villous on both surfaces. Fronds 15–45 cm long, 3-pinnate-pinnatifid, membranaceous, the margins plane.

183. *E. congestus*

3(2). Rhizomes long-creeping, the stipes distant, glabrous or nearly so..4.

4(3). Fronds 2-pinnate-pinnatifid, subcoriaceous, the margins revolute. Laminae glabrous on the adaxial surface, short-villous abaxially; fronds 10–40(60) cm long.

187. *E. warscewiczii*

4(3). Fronds pinnate-pinnatifid or subbipinnate, chartaceous, the margins nearly plane. Laminae sparsely pilose on both surfaces; fronds 15–28 cm long.

185a. *E. novogranatensis*

5(1). Rachises castaneous to very dark brown throughout; pinnule axes not flexuous, slightly retrorse, strongly arcuate-ascending; laminae glabrous.

185. *E. glaberrimus*

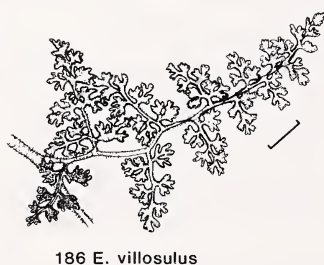
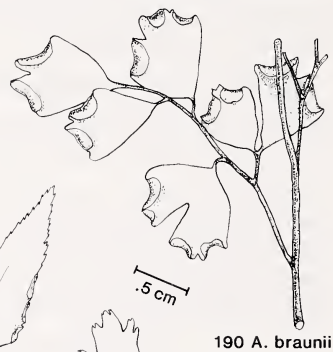
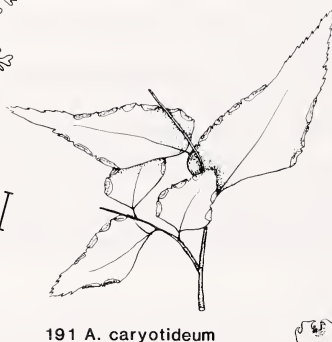
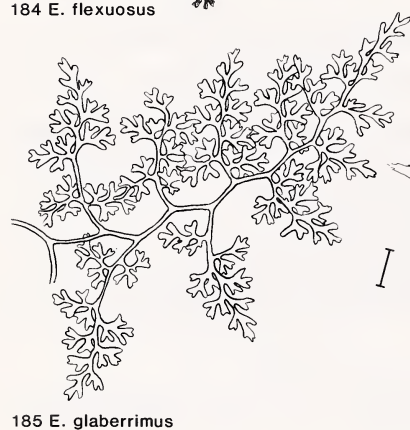
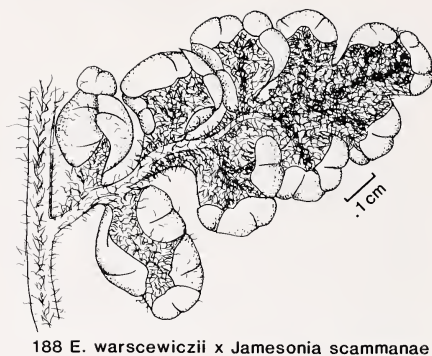
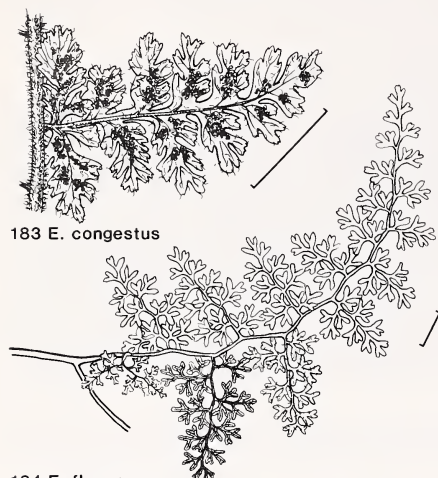
5(1). Rachises stramineous or pale brown towards the apex; pinnule axes slightly flexuous, slightly retrorse, not ascending; laminae glabrous to densely pubescent, especially on the axes..5.

6(5). Lamina tissue glabrous to sparsely pubescent; ultimate segment lobes usually (1)1.5–3 mm long and widely divergent.

184. *E. flexuosus* var. *flexuosus*

6(5). Lamina tissue densely short-villous on the abaxial surface, less so adaxially; ultimate segment lobes usually 0.5–1(1.5) mm long and not widely divergent.

186. *E. villosulus*



183. *Eriosorus congestus* (Christ) Copel. Gen. Fil. 58. 1947.

Gymnogramma congesta Christ, Bull. Herb. Boissier II, 4:1098. 1904. LECTOTYPE: La Palma, Pcia. S. José, 1459 m, *Tonduz* 12575 (P not seen; isotypes CR, G not seen, US fragm NY), chosen by Maxon (Bull. Torrey Bot. Club 42:81. 1915).

Plants terrestrial, at 1300–2600 m elevation, on road banks and in pastures and forest clearings, from the Cordillera Central, the Cordillera de Talamanca to near S. Isidro del General, and above Cerro Punta ca. 2 mi east of Guadalupe (Pcia. Chiriquí).

A. F. Tryon (1970, p. 170) reported hybrids of this species with *E. glaberrimus* from La Palma, which have slightly flexuose rachises, non-arcuate pinnae, ultimate segments similar to those of *E. congestus*, and abortive spores.

184. *Eriosorus flexuosus* (H.B.K.) Copel. Gen. Fil. 58. 1947, var. *flexuosus*.

Gymnogramma flexuosa Desv. Ges. Naturf. Freunde Berlin Mag. 5:306. 1811. TYPE: "Am. Aequin.," collector unknown (P-Hb. Desv. not seen Tryon photo).

Grammitis flexuosa H.B.K. Nov. Gen. Sp. 1:5 (fol. 4). 1816. TYPE: Near Caracas, Distr. Fed., Venezuela, *Humboldt & Bonpland* (P-Hb. Bonpl. not seen photo 4447; isotype B-Hb. Willd. 19597 not seen Tryon photo).

Gymnogramma refracta Kunze ex Klotzsch, Linnaea 20:410. 1847. TYPE: Sierra Nevada, Edo. Mérida, Venezuela, *Moritz* 359 (B not seen Tryon photo; isotypes BM not seen photo 7492, P not seen Weatherby photo, US).

Gymnogramma ruiziana Kunze ex Klotzsch, Linnaea 20:410. 1847. TYPE: Pcia. Panatahuas, Depto. Huánuco, Peru, *Ruiz* 74 (B not seen Tryon photo).

Gymnogramma haematodes Christ, Bull. Herb. Boissier II, 4:1097. 1904. TYPE: Summit of Volcán Poás, Pcia. Alajuela, 2644 m, *Tonduz* 10713 (P not seen Weatherby photo; isotype US), chosen by Maxon (Bull. Torrey Bot. Club 42:84. 1915).

Gymnogramma flexuosa var. *linearis* Christ, Bull. Herb. Boissier II, 4:1096. 1904. TYPE: Las Vueltas, Tucurrique, Pcia. Cartago, *Tonduz* 12796 (P not seen; isotype G not seen).

Gymnogramma flexuosa var. *peruviana* Hieron. Hedwigia 48:220. 1909. TYPE: Cuesta de Lejía, near Molinopampa, Depto. Amazonas, Peru, 2300 m, *Stuebel* 1055 (B not seen Tryon photo).

Gymnogramma platytrichia C. Chr. Kongl. Svenska Vetensk. Akad. Handl. 16(2):58. 1937. TYPE: Les Roseaux, Massif de la Hotte, Haiti, 2300 m, *Ekman* 10657 (S not seen; isotypes B not seen, US).

Plants terrestrial, at (600)1500–2800(3300) m elevation, in forests, clearings, and on road banks, from the Cordillera Central, the Fila de Cedral, the Cordillera de Talamanca, and the summit of the west peak of the Cerro Tacarcuna massif. Also from Hispaniola, Mexico, Guatemala, El Salvador, Venezuela, Colombia to Peru, Guyana, and Brazil.

A. F. Tryon (1970, p. 163) reported hybrids of this species with *E. warscewiczii* on Volcán Poás.

185. *Eriosorus glaberrimus* (Maxon) Scamman, Contr. Gray Herb. 191:85. 1962.

Psilogramme glaberrima Maxon, Bull. Torrey Bot. Club 42:82. 1915. TYPE: La Palma, Pcia. S. José, 1459 m, *Tonduz* 12531 (US fragm NY; isotypes CR, P not seen).

FIGS. 183–191. *Eriosorus* and *Adiantum*. FIG. 183. Median pinna of *E. congestus*, Maxon 8159. FIG. 184. Pinna of *E. flexuosus*, de la Sota 5044. FIG. 185. Pinna of *E. glaberrimus*, Standley 39424. FIG. 186. Median pinna of *E. villosulus*, Pittier 10502. FIG. 187. Median pinna of *E. warscewiczii*, *Tonduz* 10712. FIG. 188. Pinna of *E. warscewiczii* × *J. scammanae*, Tryon & Tryon 7048 (GH). FIG. 189. Median pinnule of basal pinna of *A. andicola*, Standley 34699. FIG. 190. Suprabasal pinnule of suprabasal pinna of *A. braunii*, *Tonduz* 8802. FIG. 191. Pinnules of *A. caryotideum*, Killip 2676.

Plants terrestrial, at 1200–2300 m elevation, in forests and along road banks, from the Cordillera Central and the Cordillera de Talamanca to S. Isidro del General. Also from Nicaragua.

185a. *Eriosorus novogranatensis* A. F. Tryon, Contr. Gray Herb. 200:120, f. 19. 1970.

TYPE: Boquerón de Quindiu, Depto. Tolima, Colombia, 3400 m, *Alston* 7728 (GH not seen; isotype BM not seen).

Plants epiphytic, at 1600–2200 m elevation, from Cerro Pata de Macho and Cerro Punta (both Pcia. Chiriquí). Also from Colombia.

186. *Eriosorus villosulus* (Maxon) Scamman, Contr. Gray Herb. 191:88. 1962.

Psilogramme villosula Maxon, Bull. Torrey Bot. Club 42:83. 1915. TYPE: Cerro de las Vueltas, Pcia. S. José, 3000 m, *Pittier* 10502 (US).

Plants terrestrial, at (2100)2700–3400 m elevation, in high montane and páramo regions, from the Cordillera de Talamanca.

A. F. Tryon (1970, p. 162) considered this to be a variant of *E. flexuosus*, which it may be, although it differs from typical material of that species in the shape of its ultimate segments as well as in its pubescence. Scamman (Contr. Gray Herb. 191:88. 1962) maintained *E. villosulus* as a distinct species, principally because it usually grows at higher elevations than does typical *E. flexuosus*. Some or all of the specimens of *E. villosulus* may be hybrids between *E. flexuosus* and *E. congestus* or, because they resemble *E. flexuosus* in lamina architecture, may be backcrosses between such a hybrid and *E. flexuosus*.

187. *Eriosorus warscewiczii* (Mett. in Tr. & Planch.) Copel. Gen. Fil. 59. 1947.

Gymnogramma warscewiczii Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:211 (repr. 293). 1864. LECTOTYPE: Volcán Turrialba, Pcia. Cartago, 11000 ft, *Warscewicz* 20 (B not seen Tryon photo fragm NY), chosen by Maxon (Bull. Torrey Bot. Club 42:80. 1915).

Psilogramme jimenezii Maxon, Amer. Fern J. 18:3. 1928. TYPE: Crater of Volcán Poás, Pcia. Alajuela, 2800 m, *O. Jiménez* 1034 (US fragm NY).

Plants terrestrial, at (1700)2000–3400 m elevation, on banks, often along roadsides, from the Cordillera Central, Cerro Tablazo, and the Cerro de la Muerte. Also from Colombia.

188. *Eriosorus warscewiczii* (Mett.) Copel. × *Jamesonia scammanae* A. F. Tryon

Gymnogramma kupperi Losch, Mitt. Bot. Staatssamml. München 1:21. 1950. TYPE: Chirripó Grande, Pcia. S. José?, 3500 m, *Kupper* 1223 (M not seen photo 7484), placed tentatively by A. F. Tryon (Contr. Gray Herb. 200:120. 1970).

Plants terrestrial, at 3100–3400 m elevation, in páramos, from the Cordillera de Talamanca.

If hybrids between *Eriosorus* and *Jamesonia* are assigned to a separate genus, the correct name for this hybrid is *Eriosonia kupperi* (Losch) Pic. Ser.

32. ADIANTUM L.

Plants terrestrial or sometimes epipetric; rhizomes mostly ascending or short-creeping, occasionally long-creeping, scaly especially at the apex, the scales small, lanceate, obscurely clathrate or eclathrate, brown to blackish, usually concolorous; fronds medium-sized; stipes long, wiry, shiny, atropurpureous or blackish, occasionally dark brown, often obscurely scaly or pubescent; laminae 1–3(5)-

pinnate, rarely simple, usually oblong or lanceolate with a pinnatifid apex, the apex conform in a few species, membranaceous to firmly herbaceous; ultimate segments sessile to short-stalked, articulate and deciduous in some species, flabellate, oblong, or trapezoidal, sometimes dimidiate, commonly glaucous, sparsely pilosulous or with small, dissected, even stellate scales on the abaxial surface; veins free, forked, rarely anastomosing, usually visible; sori elongate, superficial on the reflexed, marginal, usually elongate to linear false indusia; sporangia long-stalked.

Temperate to tropical regions world-wide, especially at low and middle elevations in tropical America; ca. 200 species.

SCAMMAN, E. 1960. The Maidenhair ferns (*Adiantum*) of Costa Rica. *Contr. Gray Herb.* 187:3–22.

1. Veins free; laminae 1–3(5)-pinnate..3.

1. Veins copiously anastomosing, the areolae elongate with short-tapered ends, lacking included veinlets..2.

2(1). Laminae simple. Rhizomes short-creeping, knotted, the stipe bases approximate; stipes 10–35 cm long; laminae cordate at the base, acute at the apex, 7–13 cm long, 5–7 cm wide; sori continuous along the lateral margins of the lamina.

193. *A. cordatum*

2(1). Laminae pinnate. Rhizomes long-creeping, the stipe bases 2–5 mm distant; laminae broadly triangular to broadly ovate, 10–15(20) cm long, 10–13(18) cm wide; lateral pinnae 1–3(5) subopposite to alternate pairs; terminal pinna conform; sori continuous along the lateral margins of the pinnae.

219. *A. wilsonii*

3(1). Laminae digitate-pedately divided, the basal pinna usually 4-pinnate, basiscopically developed, forming almost half the lamina. Laminae obliquely deltate, 15–20 cm long, 15–30 cm wide, usually sparsely puberulent; sori reniform to orbicular, 4–8 on the distal and outer edge of the ultimate segments.

204. *A. patens*

3(1). Laminae pinnately divided, the basal pinnae not basiscopically developed and forming half the lamina..4.

4(3). Ultimate segments several times longer than wide, partially to entirely dimidiate, sessile or very short-stalked; axes scaly or hairy in most species..18.

4(3). Ultimate segments usually no more than 1.5(2) times longer than wide, not dimidiate (except in *A. trapeziforme* and partially so in *A. caryotideum*), short- to long-stalked; axes glabrous in most species..5.

5(4). Dark color of the stalk abruptly terminating at the base of the ultimate segment, the segments articulate. Costule apex swollen in some species..10.

5(4). Dark color of the stalk gradually passing into the base of the ultimate segment, the segments never articulate..6.

6(5). Laminae pinnate. Laminae oblong, 15–25(30) cm long, 8–16(18) cm wide; pinnae glaucous, subsessile, lanceate, the distal ones excavate basiscopically; sori usually continuous on both margins.

201. *A. macrophyllum*

6(5). Laminae 2–3-pinnate..7.

7(6). Laminae 2-pinnate, the basal 2–4 pinna pairs pinnate, the many distal pinnae all simple. Laminae ovate-lanceolate, 15–35 cm long, 15–25 cm wide, the ultimate segments 2–4(5) cm long, trapeziform or ovate and excavate at the lower base.

191. *A. caryotideum*

7(6). Laminae (2)3-pinnate, almost all the pinnae 1–2-pinnate..8.

8(7). Pinnae subsessile, the basal acroscopic pinnule 1–3 mm from the rachis; rhizome scales ca. 2 mm long, 0.2 mm wide. Rhizomes compact; laminae lanceolate, (10)20–50 cm long, (6)8–25 cm

wide, (2)3-pinnate; basal acroscopic pinnules larger than the distal pinnules or segments, overlapping the rachis throughout the lamina.

192. *A. concinnum*

8(7). Pinnae decidedly stalked, the basal acroscopic pinnule 5–25 mm from the rachis; rhizome scales ca. 2.5–5 mm long, 0.4 mm wide..9.

9(8). Rhizomes stout, compact, the stipes fasciculate; ultimate segments cuneate to cuneate-flabellate, lobed to incised along the outer margin; sori orbicular to suborbicular. Laminae lanceolate, (10)15–45 cm long, (5)10–15 cm wide, (2)3-pinnate.

210. *A. raddianum*

9(8). Rhizomes slender, short- to long-creeping, the stipes up to 5 mm distant; ultimate segments mostly orbicular to suborbicular, entire to lobed along the outer margin; sori oblong to lunulate. Laminae lanceolate, 10–35 cm long, 5–20(23) cm wide, 3-pinnate.

207. *A. poiretii*

10(5). Laminae 2-pinnate or more divided..13.

10(5). Laminae pinnate..11.

11(10). Lateral pinnae much longer than wide, 6–9 cm long, broadly ovate-lanceolate, glaucous abaxially; laminae with a conform apical pinna, never flagelliform and rooting at the apex.

211. *A. seemannii*

11(10). Lateral pinnae no longer than wide, less than 2 cm long, lunulate, obovate, or nearly triangular, not glaucous abaxially; laminae usually flagelliform and rooting at the apex, sometimes with a conform apical pinna..12.

12(11). Laminae 4–8 cm wide; sterile pinna margins entire; lateral pinnae lunulate, (1.5)2–3 times wider than long; rhizome scales ca. 0.4 mm wide, concolorous.

200. *A. lunulatum*

12(11). Laminae 2–4 cm wide; sterile pinna margins sharply toothed with a vein ending in each tooth; lateral pinnae obovate or nearly triangular, usually 1–1.5 times wider than long; rhizome scales ca. 0.15 mm wide, weakly bicolorous.

195. *A. deflectens*

13(10). Costule apices not swollen, the segments slightly articulate..15.

13(10). Costule apices swollen, the segments readily articulate..14.

14(13). Lateral pinnules or ultimate segments of pinnules mostly obtuse at the base (up to a 150° angle); margins of sterile segments entire or nearly so; rhizome scales up to 5(8) mm long, 0.75 mm wide, concolorous, yellow-brown, sparsely short-ciliate. Laminae ovate-lanceolate, (15)25–60 cm long, (5)10–45 cm wide.

208. *A. princeps*

14(13). Lateral pinnules or ultimate segments of pinnules mostly acute at the base; margins of sterile segments finely serrulate, especially at the apex; rhizome scales up to ca. 3 mm long, 0.5 mm wide, weakly bicolorous, usually rather dark brown, densely short- to long-ciliate. Laminae ovate-lanceolate, 10–30 cm long, 10–25 cm wide.

213. *A. tenerum*

15(13). Ultimate segments mostly 2.5–5 cm long, acute or acuminate at the apex..17.

15(13). Ultimate segments mostly less than 2 cm long, truncate or round at the apex..16.

16(15). Costae and costules without an axillary pale area at the point of their insertion. Laminae lanceolate or ovate-lanceolate, 3–4-pinnate, 20–45 cm long, 10–25 cm wide, distinctly glaucous.

189. *A. andicola*

16(15). Costae and costules with an axillary pale area at the point of their insertion. Laminae lanceolate, 3(4)-pinnate, 20–40 cm long, 15–25(30) cm wide, slightly glaucous.

190. *A. braunii*

17(15). Laminae 1–2-pinnate; sori commonly 10 mm wide; pinnule margins entire. Laminae lanceolate, longer than wide, 20–30 cm long, 15–25 cm wide.

211. *A. seemannii*

17(15). Laminae 3–4-pinnate; sori 1–2 mm wide; pinnule margins lobed. Laminae very broadly ovate, about as long as wide, 20–40 cm long, 20–35 cm wide.

216. *A. trapeziforme*

18(4). Laminae 3–5-pinnate at the base. Laminae broadly ovate, sometimes wider than long, 40–60 cm long, 40–90 cm wide; axes with rather stiff, multicellular, yellowish hairs and similar narrow scales.

205. *A. pectinatum*

18(4). Laminae 1- or 2-pinnate at the base..19.

19(18). Rachis covered, mostly adaxially, with short, rather stiff, straight, glandular hairs; scales absent; sori about as wide as long, on low lobes. Laminae 2-pinnate, broadly ovate, 25–35 cm long, 20–25 cm wide, usually with 2 pairs of lateral, compound pinnae.

217. *A. urophyllum*

19(18). Rachis covered, mostly abaxially, with narrow scales often with expanded, laxly toothed or hairy bases; lax, twisted hairs also sometimes present; sori mostly much longer than wide, not on low lobes..20.

20(19). Rachis scales narrow, ca. 3 mm long, decidedly spreading. Laminae 2-pinnate, ovate to oblong, 20–45 cm long, 20–30 cm wide, with (3)4–7 pairs of lateral, compound pinnae.

194. *A. decoratum*

20(19). Rachis scales narrow, 1–2.5 mm long, usually not strongly spreading..21.

21(20). Laminae abaxially glabrous or sparsely covered with narrow scales with expanded and/or ciliate bases, glaucous or not..23.

21(20). Laminae abaxially sparsely covered with jointed hairs, these not expanded and ciliate at the base..22.

22(21). Laminae glaucous abaxially; pinnules more than half their width distant. Laminae 2-pinnate, broadly lanceate to broadly triangular, (15)20–30(40) cm long, (7)10–25(30) cm wide, with 1–3(4) pairs of lateral, compound pinnae.

197. *A. humile*

22(21). Laminae not glaucous abaxially; pinnules less than half their width distant. Laminae 2-pinnate, ovate to oblong, 15–20 cm long, 12–20 cm wide, with 2–4 pairs of lateral, compound pinnae.

214. *A. terminatum*

23(21). Mature laminae always 2-pinnate with the terminal pinna about the same size as the (2)3–8(12) pairs of lateral, compound pinnae and usually tapered at the base..29.

23(21). Mature laminae pinnate or 2-pinnate with the terminal pinna larger than the 1–2(3) pairs of lateral, compound pinnae and usually not tapered at the base..24.

24(23). Sori oblong, several on the acroscopic, outer, and sometimes basiscopic edge of the rounded or acute pinnae or pinnules..26.

24(23). Sori linear, 1(3) each on the acroscopic and outer or basiscopic edge of the acute to acuminate pinnae or pinnules..25.

25(24). Pinnae or pinnules lanceate, uniformly tapering to an acute or acuminate apex; laminae 1(2)-pinnate, oblong to lanceate, (15)20–35 cm long, (5)10–20 cm wide, with 0–1(2) pairs of lateral, compound pinnae.

199. *A. lucidum*

25(24). Pinnae or pinnules oblong, usually with a distinct outer edge; laminae 2-pinnate, oblong, ovate-lanceolate, or triangular, 20–45 cm long, 20–30 cm wide, with 1–4 pairs of lateral, compound pinnae.

218. *A. villosum*

26(24). Laminae 2-pinnate with (1)2–3(4) pairs of lateral, compound pinnae; rhizomes long-creeping with the fronds (8)10–20 mm distant, 1.5–2.5 mm in diam. including the stipe bases. Laminae broadly lanceate to broadly ovate, (12)15–25(40) cm long, 20–30 cm wide.

198. *A. latifolium*

26(24). Laminae pinnate or 2-pinnate with 1 pair of compound pinnae; rhizomes short-creeping with the fronds 1–3(5) mm distant, (1)2–5 mm in diam. including the stipe bases..27.

27(26). Proximal simple pinnae truncate and not overlapping the rachis at the acroscopic base, 2.5–3.5 times longer than wide; sterile lamina margins biserrate; rhizome scales appressed. Laminae pinnate and lanceate or 2-pinnate and triangular, 10–20(22) cm long, (3.5)6–10(12) cm wide, with 0–1 pair of lateral, compound pinnae, sparsely scaly.

202. *A. obliquum*

27(26). Proximal simple pinnae cordate to subcordate and overlapping the rachis at the acroscopic base, (1.5)2–2.5(3) times longer than wide; rhizome scales spreading..28.

28(27). Laminae not glaucous, scaly, the scales ciliate at the base; sterile lamina margins usually slightly biserrate. Laminae pinnate and lanceate or rarely 2-pinnate and triangular, 9–26 cm long, 5–15 cm wide, with 0 or 1 pair of lateral, compound pinnae.

203. *A. obliquum* × *petiolatum*

28(27). Laminae glaucous, not scaly; sterile lamina margins uniformly serrate. Laminae pinnate, ovate, lanceolate, or oblong, 10–20(25) cm long, (3)5–12 cm wide.

206. *A. petiolatum*

29(23). Lateral pinnae 1–2(2.5) cm wide. Laminae ovate-lanceolate to oblong, 20–30(40) cm long, 10–25(30) cm wide, with (2)3–6(10) pairs of lateral, compound pinnae; pinnules oblong, obtuse to round at the apex, fertile on the acroscopic and outer margins, the sori 1–several, the fertile margin often strongly revolute; rhizomes creeping, 2–5 mm in diam.; stipes 1–10 mm distant.

212. *A. serratodentatum*

29(23). Lateral pinnae more than (2.2)2.5 cm wide..30.

30(29). Sori on the acroscopic margin of the pinnules (3)5–many, elongate, usually 2–5 times longer than wide..32.

30(29). Sori on the acroscopic margin of the pinnules 1(3), linear, usually more than 10 times longer than wide..31.

31(30). Pinnules with a single linear or slightly curved sorus on the acroscopic margin, almost completely dimidiate, the midrib close to the basisopic margin throughout the length of the pinnule. Laminae broadly ovate-lanceolate to oblong, 20–35 cm long, 15–25(30) cm wide, with (2)4–8 pairs of lateral, compound pinnae.

209. *A. pulverulentum*

31(30). Pinnules with linear sori on the acroscopic, outer, and often apical portion of the basisopic margin, excavate at the basisopic base but not dimidiate, the midrib central in the pinnule. Laminae oblong, broadly ovate-lanceolate, or triangular, 20–45 cm long, 20–30 cm wide, with 1–4 pairs of lateral, compound pinnae.

218. *A. villosum*

32(30). Subapical pinnules ca. 1/2 as long as the median ones; stipes (8)10–20 mm distant. Laminae broadly lanceate to broadly ovate, (12)15–25(40) cm long, 20–30 cm wide, with (1)2–3(4) pairs of lateral, compound pinnae.

198. *A. latifolium*

32(30). Subapical pinnules ca. 1/4 as long as the median ones; stipes 1–3 mm distant..33.

33(32). Most fertile pinnules with the sterile apex turned toward the pinna apex and acute, the midrib distinct more than half way to the pinnule apex, submarginal distally, the veins distinctly prominent; rhizomes long-creeping, the stipes usually distant. Laminae triangular to broadly ovate, (15)20–35(40) cm long, (12)20–30(40) cm wide, with 2–4 pairs of lateral, compound pinnae.

215. *A. tetraphyllum*

33(32). Most fertile pinnules with the sterile apex straight and obtuse, the midrib distinct only at the pinnule base, the veins slightly prominent; rhizomes short-creeping, the stipes approximate. Laminae broadly ovate, 25–40 cm long, 20–30(40) cm wide, with 3–8(12) pairs of lateral, compound pinnae.

196. *A. fructuosum*

189. *Adiantum andicola* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvid. Afd. V, 1:266 (repr. 114). 1849.

Adiantum cuneatum var. *angustifolium* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:70. 1842, as "*angustifolia*." LECTOTYPE: Pic d'Orizaba, Edo. Veracruz, Mexico, 9500 ft, *Galeotti 6266* (BR not seen; isoelectotype K not seen Tryon photo), chosen by Morton (Contr. U. S. Natl. Herb. 38:216. 1973).

Adiantum tenerum var. *dissectum* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:71. 1842. TYPE: Edo. Oaxaca, Mexico, 8000 ft, *Galeotti 6361* (BR not seen photo 5063).

Adiantum amabile Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturv. Afd. V, 1:265 (repr. 113). 1849. LECTOTYPE: Between Tonagua and Roayaga, Edo. Oaxaca, Mexico, *Liebm. Fl. Mex. 826 (fol.)* (C), chosen by A. R. Smith (Fl. Chiapas 2:19. 1981).

Adiantum glaucophyllum Hook. Sp. Fil. 2:40. 1851. LECTOTYPE: Chiriquí, "Veraguas" [Pcia. Chiriquí], Feb 1849, *Seemann* (K not seen Kew photo), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:704. 1977). This is the specimen illustrated later by Hooker (Icon. Plant. 10:t. 961. 1854).

Adiantum cooperi Baker, J. Bot. Brit. For. 25:25. 1887. TYPE: Costa Rica, *Cooper* (K not seen Tryon photo fragm NY).

Adiantum palmense Christ, Bull. Soc. Bot. Genève II, 1:230. 1909. TYPE: La Palma, Pcia. S. José, 1800 m, *Wercklé 17063* (P-Hb. Christ not seen Tryon photo).

Adiantum amplum var. *concolor* Rosenst. Repert. Spec. Nov. Regni Veg. 22:6. 1925. TYPE: Candelaria, Pcia. S. José, 1700 m, *Brade & Brade 207* (S not seen; isotype UC).

TYPE: Cerro de Zempoaltepec, Edo. Oaxaca, Mexico, 9000 ft, *Liebm. Pl. Mex. 2203, Fl. Mex. 434* (C not seen frags NY and US).

Plants terrestrial, at 1200–1800 m elevation, in forests and ravines, from Monteverde, the Cordillera Central, the Cerro de Piedra Blanca and Cerro Tablazo (Pcia. S. José), and the Cordillera de Talamanca. Also from Mexico to Nicaragua, Venezuela, and Colombia.

190. *Adiantum braunii* Mett. ex Kuhn, Linnaea 36:75. 1869.

Adiantum braunii var. *cuneatum* Mett. ex Kuhn, Linnaea 36:75. 1869, as "*cuneata*." TYPE: Mexico, *Berlandier 1151* (B not seen).

Adiantum convolutum Fourn. Mexic. Pl. 1:127, t. 6. 1872. SYNTYPES: Mexico, *Ghiesbreght 406* (P not seen) and Orizaba, Edo. Veracruz, Mexico, *Botteri 18* (P not seen).

Adiantum heteroclitum Christ, Bull. Herb. Boissier II, 4:1094. 1904. TYPE: Costa Rica, *Wercklé* in 1903 (P-Hb. Christ not seen photo 2597).

TYPE: Mexico, *Karwinsky* (B not seen; isotype BR not seen).

Plants terrestrial, at 1000–1100 m elevation, along rivers and streams, from the Meseta Central. Also from Mexico, Guatemala, El Salvador, Nicaragua, Venezuela, Colombia, and Ecuador.

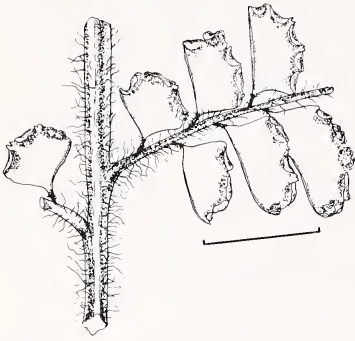
191. *Adiantum caryotideum* Christ, Bull. Soc. Bot. Genève II, 1:230. 1909.

TYPE: Costa Rica, *Wercklé* in 1904 (P-Hb. Christ not seen Tryon photo).

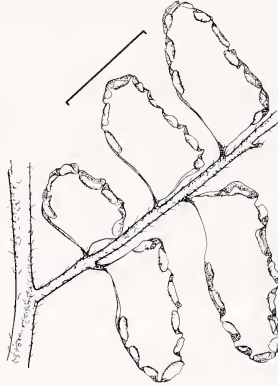
Plants terrestrial, at 0–100 m elevation, on river banks, from the unlocalized type locality, the upper Río Pedregal (Pcia. Los Santos), and near Pacora, the Tocumen river, and the vicinity of Juan Díaz (all Pcia. Panama). Also from Mexico and Guatemala.

192. *Adiantum concinnum* Willd. Sp. Pl. ed. 4, 5:451. 1810.

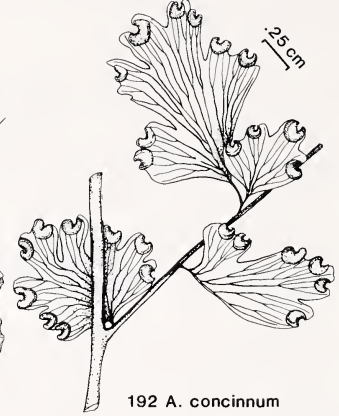
Adiantum lutescens Moug. ex Fée, Gen. Fil. [Mém Foug. 5]:119. 1852. TYPE: Edo. Oaxaca, Mexico, collector unknown (Hb. Mougeot not seen). Synonymized by Christensen (Ind. Fil. 29. 1905).



194 *A. decoratum*



198 *A. latifolium*



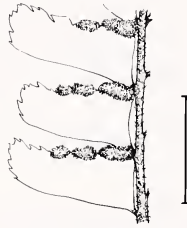
192 *A. concinnum*



195 *A. deflectens*



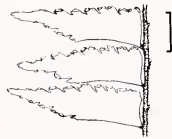
200 *A. lunulatum*



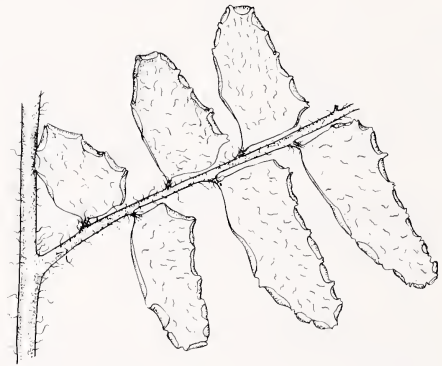
196 *A. fruticosum*



193 *A. cordatum*



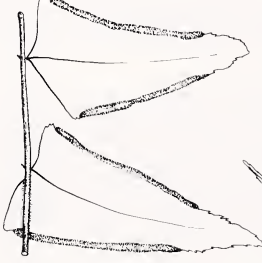
202 *A. obliquum*



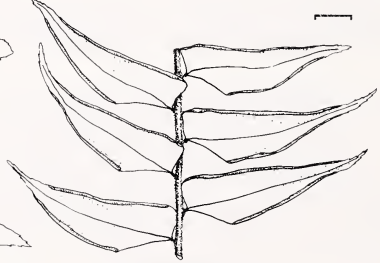
197 *A. humile*



203 *A. obliquum*
x petiolatum



201 *A. macrophyllum*



199 *A. lucidum*

Adiantum concinnum var. *integrum* T. Moore, Ind. Fil. 23. 1857. TYPE: Based on *A. concinnum* var. β Hook. (Sp. Fil. 2:42. 1851), nom. illeg., and so based on the basis of that name, which is Andes of Quito, Pcia. Pichincha, Ecuador, *Jameson 16* (K not seen).

Adiantum concinnum var. *laxum* T. Moore, Ind. Fil. 23. 1857. TYPE: Chachapoyas, Depto. Amazonas, Peru, *Mathews 1850* (K not seen). See Hooker (Sp. Fil. 2:43. 1851) for a brief but valid description and statement of the type.

?*Adiantum concinnum* var. *subscandens* Baker, Syn. Fil. 123. 1867. TYPE: Mt. Chimborazo, Pcia. Chimborazo, Ecuador, *Spruce 5706* (K not seen).

LECTOTYPE: Cumaná, Edo. Sucre, Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 20099-2 not seen Tryon photo fragm GH), chosen by Tryon (Contr. Gray Herb. 194:168. 1964).

Plants terrestrial or epipetric, at 0–1700(2100) m elevation, in disturbed, open areas on banks, cliffs, and roadsides, from throughout Costa Rica and western Panama. Also from Cuba, Jamaica, the Lesser Antilles, Mexico to Nicaragua, Trinidad, Venezuela, and Colombia to Bolivia.

193. *Adiantum cordatum* Maxon, Amer. Fern J. 21:136. 1931.

TYPE: Near Puerto Obaldía, Com. S. Blas, 0–50 m, *Pittier 4297* (US; isotypes GH, NY).

Plants terrestrial, at 0–100 m elevation, from the Caribbean lowlands of central Panama. Also from French Guiana.

194. *Adiantum decoratum* Maxon & Weath. Amer. J. Bot. 19:165. 1932.

TYPE: Río Tapia, Pcia. Panama, *Standley 26216* (US).

Plants terrestrial, at 0–800 m elevation, along streams, from the Peninsula de Nicoya and the Pacific lowlands of central Costa Rica, the Atlantic and Pacific lowlands of Panama, and near Riosucio (Depto. Chocó). Also from Mexico to Honduras and Nicaragua.

195. *Adiantum deflectens* Mart. Icon. Pl. Crypt. Bras. 94. 1834.

Adiantum dolabriforme Hook. Icon. Pl. 2:t. 191. 1837. TYPE: Brazil, *Gardner 55* (K not seen photo 15142).

Adiantum filiforme Gardn. in Hook. Icon. Pl. 6:t. 503. 1843. TYPE: Near Oeiras, Est. Piauí, Brazil, *Gardner 2391* (K not seen photo 15148).

Adiantum flagellum Fée, Gen. Fil. [Mém. Foug 5]:117. 1852. TYPE: Brazil, *collector unknown* (Hb. Mougeot not seen).

Adiantum subaristatum Fée, Crypt. Vasc. Brésil 1:33, t. 8, f. 2. 1869. TYPE: Est. Bahia, Brazil, *Blanchet 2373* (RB not seen).

Adiantum deflectens var. *tremulum* Hieron. Bot. Jahrb. Syst. 34:487. 1904, as “*tremula*.” LECTOTYPE: Near Colonia Tovar, Edo. Aragua, Venezuela, *Fendler 81* (US), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:703. 1977).

FIGS. 192–203. *Adiantum*. FIG. 192. Basal portion of pinna of *A. concinnum*, Smith 48/109. FIG. 193. Frond of *A. cordatum*, Pittier 4297. FIG. 194. Basal portion of median pinnae of *A. decoratum*, Biolley 2017. FIG. 195. Median pinna of *A. deflectens*, Lellinger 701. FIG. 196. Median pinnules of median pinna of *A. fruticosum*, Biolley. FIG. 197. Basal portion of median pinna of *A. humile*, Killip 2834. FIG. 198. Basal portion of median pinna of *A. latifolium*, Maxon 4770. FIG. 199. Median pinnae of *A. lucidum*, Correll 12276. FIG. 200. Median pinnae of *A. lunulatum*, Bartlett & Lasser 16842. FIG. 201. Pinnae of *A. macrophyllum*, Smith 6869. FIG. 202. Median pinnae of *A. obliquum*, Killip 2902. FIG. 203. Median pinnae of *A. obliquum* \times *petiolatum*, Pittier 5208.

TYPE: Santarém, Est. Pará, Brazil, *Martius* (M not seen).

Plants epipetric or terrestrial, at 0–100 m elevation, in open areas, from the Pacific coastal plain of northern Costa Rica, the Canal Zone, and S. José Island (Pcia. Panama). Also from Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Venezuela, Colombia to Peru, French Guiana, Brazil, and Paraguay.

196. *Adiantum fructuosum* Poepp. ex Spreng. Syst. Veg. ed. 16, 4:113. 1827.

Adiantum rigidum Link, Fil. Sp. 69. 1841, non K. Presl, 1836. TYPE: Based on material cultivated in the botanical garden at Berlin, according to Link sent by Poeppig from Chile (B not seen), an origin which Hooker (Sp. Fil. 2:22. 1858) rightly doubted.

Adiantum pachysorum Reichenb. ex Kunze, Linnaea 21:224. 1848. TYPE: Near Poelebantje, Surinam, *Kappler 1732o* (LZ destroyed?).

Adiantum tetraphyllum var. *majus* Fourn. Mexic. Pl. 1:129. 1872. TYPE: Essentially a renaming of *A. fructuosum* Kunze, and so based on the type of that name. See Lellinger (Proc. Biol. Soc. Wash. 89:704. 1977) for details of the typification.

TYPE: Cuba, *Poeppig* in 1822 (LZ destroyed; isotype B not seen fragm US, L not seen photo 259).

Plants terrestrial, at 0–1000 m elevation, from throughout the Flora area. Also from Cuba, Hispaniola, Trinidad, Venezuela, Colombia to Peru, and Brazil.

The distinctions between this species and *A. tetraphyllum* mentioned in the key seem to hold for specimens from the Flora area, but specimens from the West Indies are more difficult to distinguish.

197. *Adiantum humile* Kunze, Linnaea 9:80. 1834.

Adiantum killipii Maxon & Weath. Amer. J. Bot. 19:166. 1932. TYPE: Ancón Hill, Canal Zone, *Killip 2752* (US).

LECTOTYPE: Tocache, Depto. S. Martín, Peru, Aug 1830, *Poeppig* (W not seen), chosen by Tryon (Contr. Gray Herb. 194:161. 1964).

Plants terrestrial, at 0–800 m elevation, in forests and ravines, from the Canal Zone and vicinity and eastern Panama. Also from Belize, Trinidad, Colombia, Peru, and Surinam.

This species is unique among its group in the Flora area for having true hairs, rather than narrow scales, on the abaxial surface of the laminae.

198. *Adiantum latifolium* Lam. Encyc. Méth. 1:43. 1783.

Adiantum denticulatum Swartz, Nov. Gen. Sp. Pl. Prodr. 135. 1788, non Burm., 1768, nom. illeg. TYPE: Jamaica, *Swartz* (S not seen Maxon photo).

Adiantum elatum Desv. Ges. Naturf. Freunde Berlin Mag. 5:327. 1811. TYPE: "Habitat in Brazil," *Dombey* (P-Hb. Juss. Cat. 1421 not seen photo 3153).

Adiantum triangulatum Kaulf. Enum. Fil. 204. 1824. TYPE: Trinidad, *Ryan* (C not seen Maxon photo).

Adiantum fovearum Raddi, Pl. Bras. Nov. Gen. 1:58, t. 77. 1825. TYPE: Vicinity of Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Adiantum haenkeanum K. Presl, Reliq. Haenk. 1:62. 1825. TYPE: Guayaquil, Pcia. Guayas, Ecuador, *Haenke* (PRC not seen; isotypes B not seen, K not seen).

Adiantum laxum Kunze, Linnaea 9:79. 1834. TYPE: Cuba, *Poeppig* in 1822 (LZ destroyed; isotype B not seen fragm US).

Adiantum argutum Splitg. Tijdschr. Natuurl. Gesch. Physiol. 7:427. 1840. SYNTYPES: Near Blaauwe Berg, Surinam, *Splitgerber 290* (L not seen photo 193) and *891* (L not seen photo 194).

Adiantum lucidum var. *bipinnatum* Mett. ex Fourn. Mexic. Pl. 1:129. 1872. LECTOTYPE: Teapa, Edo. Tabasco, Mexico, *Linden* (P not seen photo 2606), chosen by Lellinger (Mem. N. Y. Bot. Gard. 23:13. 1972).

Adiantum triangulatum var. *acuminatum* Jenm. Bull. Bot. Dept. Jamaica 33:7. 1892. TYPE: Jamaica, *Jenman* (NY? not seen).

Adiantum intermedium var. *medioximum* Christ, Bot. Jahrb. Syst. 24:93. 1897. TYPE: Castleton, Jamaica, *Harris 1554* (P not seen photo 2604).

Adiantum fovearum var. *reductum* Jenm. Ferns Brit. W. Ind. Guiana 87. 1899. TYPE: Corentyn River, Guyana, *Jenman* (NY not seen).

Adiantum fovearum var. *major* Rosenst. Repert. Spec. Nov. Regni Veg. 21:345. 1925. TYPE: Morro das Pedros, Munic. Iguape, Est. S. Paulo, Brazil, *Brade 7764* (S not seen).

Adiantum latifolium var. *grisebachianum* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. [Pterid. Dominica] 2: 139. 1929. SYNTYPES: Roseau, Dominica, *Domin* (PRC not seen); and Mayagüez, Puerto Rico, *Sintenis Pl. Portoric. 436b* (PRC? not seen).

TYPE: Uncertain, but possibly Brazil, *Commerson* (P-Hb. Juss. Cat. 1408 not seen photo 3151), according to the note accompanying Morton's photograph. Proctor (Fl. Less. Antill. 186. 1977) has designated as the neotype Guadeloupe, *Proctor 20110* (A not seen; isoneotype US).

Plants terrestrial, at 0–100 m elevation, in forests, from the Atlantic coastal plain of Costa Rica, Panama, and the northern part of the Chocó. Also from throughout tropical America.

One specimen (*Tonduz 14561*, US) seems to be intermediate between this species and *A. obliquum*. It has rhizomes and frond division like those of *A. latifolium*, but pinnae and pinnules like those of *A. obliquum*.

199. *Adiantum lucidum* (Cav.) Swartz, Syn. Fil. 121. 1806.

Pteris lucida Cav. Descr. Pl. 266. 1801. TYPE: Guaranda, Pcia. Pichincha, Ecuador, *Née* (isotype S not seen). The holotype was not seen by Christensen at MA (Dansk Bot. Ark. 9(3):22. 1937).

Pteris aspera Poir. Encyc. Méth. 5:713. 1804. TYPE: French Guiana, *Leblond* (P-Hb. Lam. not seen).

Adiantum varium Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:435. 1810. TYPE: Between Caripe and Guardia de S. Agustín, Edo. Monagas, Venezuela, *Humboldt 453* (B-Hb. Willd. 20106-1 and -2 not seen Tryon photos).

Plants terrestrial, at 0–300 m elevation, in forests, from the lowlands of Panama and the northern portion of the Chocó. Also from Nicaragua, Trinidad and Tobago, Venezuela, Colombia to Peru, and French Guiana.

200. *Adiantum lunulatum* N. L. Burm. Fl. Indica 235. 1768.

Adiantum philippense L. Sp. Pl. 2:1094. 1753, nom. dub. See Verma (Nova Hedwigia 3:463–468. 1961) and Morton (Contr. U. S. Natl. Herb. 38:371. 1974) for the arguments concerning the status of this name.

Adiantum arcuatum Swartz, Syn. Fil. 122. 1806. TYPE: Based on *A. lunulatum* sensu Cav. (Descr. Pl. 272. 1801), non L., 1753, which is based on a specimen from the "Marianas, the Philippines and Mexico," *Née* (MA? not seen). Synonymized by Christensen (Dansk Bot. Ark. 9(3):25. 1937).

LECTOTYPE: Malabar, India, *Burmman* (G not seen photo 16782), chosen by Morton (Contr. U. S. Natl. Herb. 38:370. 1974).

Plants terrestrial or epipetric, at 0–400(800) m elevation, in forests and open areas, from the Cordillera de Tilarán, the Pacific coastal plain of Costa Rica and Panama, and the Canal Zone. Also from Cuba, Mexico to Nicaragua, Venezuela, and Colombia.

201. *Adiantum macrophyllum* Swartz, Nov. Gen. Sp. Pl. Prodr. 135. 1788.

Adiantum macrophyllum var. *glaucum* T. Moore, Gard. Chron. III, 3:260, f. 126, 127. 1875. TYPE LOCALITY: Colombia and Peru.

TYPE: Jamaica, *Swartz* (S not seen; isotype SBT not seen).

Plants terrestrial, at 0–900(1400) m elevation, on wet banks and in ravines, from the wetter parts of Costa Rica, Panama, and the adjacent Chocó. Also from the Antilles, Trinidad, Mexico to Nicaragua, and tropical South America except Guyana and French Guiana.

202. *Adiantum obliquum* Willd. Sp. Pl. ed. 4, 5:429. 1810.

Adiantum macropus Schrad. Goett. Gel. Anz. 1824:872. 1824. TYPE: Brazil, *Prince Maximilian zu Wied-Neuwied* (GOET or LE not seen).

Adiantum macrodus Kaulf. ex Kunze, Flora 22(1), Beibl. 42. 1839. TYPE: Ilheus, Est. Bahia, Brazil, *Martius?* or *Prince Maximilian zu Wied-Neuwied?* (not seen).

Adiantum obliquum var. *majus* Hook. Sp. Fil. 2:8, t. 79A, f. 1. 1851. SYNTYPES: Colombia, *Cuming 1202* (K not seen); Montagne de Mahurie, French Guiana, *Leprieur* (K not seen); Tanaii, near Pará, Est. Pará, Brazil, *Spruce 39* (K not seen); and Guadeloupe, *L'Herminier* (K not seen).

Adiantum obliquum var. *bipinnatum* Christ, Bull. Herb. Boissier II, 4:1094. 1904. TYPE: Costa Rica, *Wercklé* (P not seen).

LECTOTYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer* (B-Hb. Willd. 20067-1 not seen Tryon photo), chosen by Lellinger (Mem. New York Bot. Gard. 23:13. 1972).

Plants terrestrial, at 0–700(1500) m elevation, in forests, from the Cordillera Central, the Atlantic coastal plain of Costa Rica, the lowlands of Panama, and the northern half of the Chocó. Also from throughout tropical America.

The rhizome scale cells of this species are shorter than are those of *A. petiolatum* or *A. obliquum* × *petiolatum*, the rhizome scales are thinner, laxer, and larger, and the veins of the laminae are more prominulous abaxially.

203. *Adiantum obliquum* Willd. × *petiolatum* Desv.

Plants terrestrial, at 0–200 m elevation, from the Canal Zone and vicinity.

Although these specimens have 64 apparently normal spores per sporangium and are known to be sexual tetraploids, they are intermediate between their putative parents, sharing the lamina scales of *A. obliquum* and the pinna shape and rhizome scales of *A. petiolatum*. They are also intermediate between these two species with respect to pinna number and marginal lamina serrations.

204. *Adiantum patens* Willd. Sp. Pl. ed. 4, 5:439. 1810.

TYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer* (B-Hb. Willd. 20078 not seen Tryon photo fragm NY; isotype W not seen).

Plants terrestrial, at 1000–2100 m elevation, in forests and along roadsides and trails, from the Meseta Central, Cerro Tablazo, and the Cordillera de Talamanca to Cerro Chirripó. Also from Mexico, Guatemala, Honduras, El Salvador, Venezuela, and Colombia to Bolivia.

205. *Adiantum pectinatum* Kunze ex Baker, Syn. Fil. 120. 1867.

SYNTYPES: Brazil, *Burchell 7416* (K not seen; isosynotype P not seen photo 2616); and Tarapoto, Depto. S. Martín, Peru, *Spruce 4781* (K not seen; isotype P not seen photo 2615).

Plants terrestrial, at 0–500 m elevation, from the Pacific lowlands of central Costa Rica. Also from Peru, Bolivia, Brazil, and Argentina.

The name *A. pectinatum* Kunze ex Ettingsh. (Farnkr. Jetztw. 85, t. 45, f. 14–16. 1864) must be considered a nomen nudum because there is no description and the three figures are coordinate, each being a pinna; therefore there is no “illustration with analysis” to validate the name.

206. *Adiantum petiolatum* Desv. Ges. Naturf. Freunde Berlin Mag. 5:326. 1811.

Adiantum oblongatum Schrad. Goett. Gel. Anz. 1824:872. 1824. TYPE: Brazil, *Prince Maximilian zu Wied-Neuwied* (GOET or LE not seen).

Adiantum kaulfussii Kunze, Linnaea 21:221. 1848. LECTOTYPE: Martinique, *Sieber Fl. Mart.* 371 (B not seen), chosen by Tryon (Contr. Gray Herb. 194:149. 1964). The other syntype is: Beekhuizen Plantation, Surinam, *Kegel* (LZ destroyed).

Adiantum lucidum var. *pinnatum* Fourn. Mexic. Pl. 1:129. 1872. LECTOTYPE: Teapa, Edo. Tabasco, Mexico, *Linden* (P not seen photo 2605), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:704. 1977).

TYPE LOCALITY: French Guiana and Brazil. No specimen at P was seen by Weatherby or Tryon.

Plants terrestrial, at 0–600 m elevation, in forests, from throughout the Flora area. Also throughout tropical America.

This species occasionally has long-creeping rhizomes with rather widely spaced stipes (ca. 1 cm); in this character it mimics *A. latifolium*. Intermediates exist between the specimens with ovate or lanceolate fronds bearing few lateral pinnae and those with oblong laminae bearing many pairs of pinnae. The latter slightly resemble *A. obliquum*, which see for a further comment on this species.

207. *Adiantum poiretii* Wikstr. Kongl. Vetensk. Acad. Handl. II, 12:443. 1826.

Adiantum crenatum Poir. Encyc. Méth. Suppl. 1:137. Sept 1810, non Willd., Mar 1810, nom. illeg. TYPE: Tristan d'Acuna, *Petit-Thouars* (P-Hb. Juss. 1427 not seen).

Adiantum pellucidum Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:72. t. 19. 1842. TYPE: Near Tanetse and Talea, Edo. Oaxaca, Mexico, *Galeotti 6461* (BR not seen; isotypes BR, C, K, LE none seen).

Adiantum gratum Fée, Gen. Fil. [Mém. Foug. 5]:119. 1852. Near Nolasco, Edo. Oaxaca, Mexico, *Galeotti 6542* (presumably P not seen).

TYPE: A renaming of *A. crenatum* Poir., and so based on the type of that name.

Plants terrestrial or epipetric, at 100–1500(2100) m elevation, in forests and ravines, from the Cordillera Central, the Meseta Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Hispaniola, Mexico, Guatemala, El Salvador, Venezuela, Colombia to Bolivia, Brazil, Paraguay, Uruguay, Argentina, and Chile.

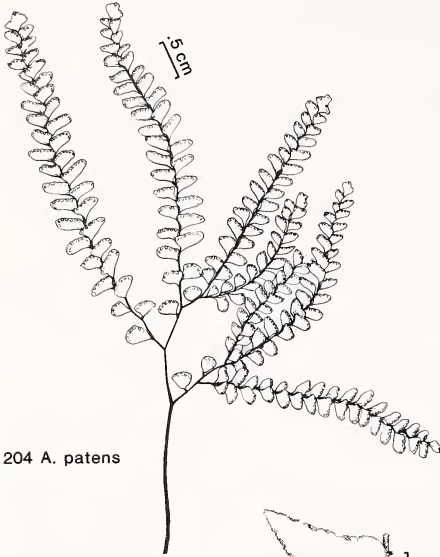
This species has the stalks of the ultimate segments longer than those of *A. raddianum*.

208. *Adiantum princeps* T. Moore, Gard. Chron. III, 4:197, f. 43, 44. 1875.

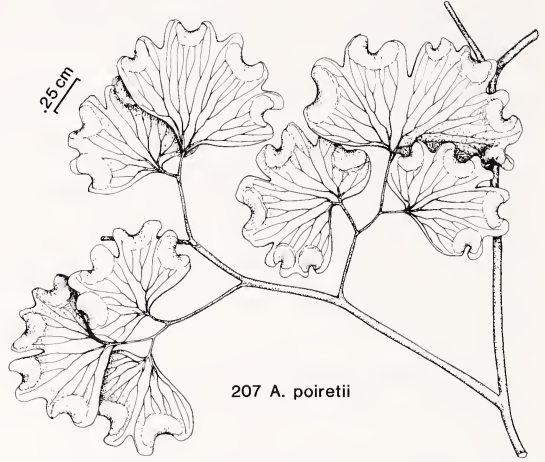
?*Adiantum amplum* K. Presl, Reliq. Haenk. 1:63. 1825. TYPE: Mexico, *Haenke* (PRC not seen).

Adiantum subtrapezoideum Christ, Bull. Herb. Boissier II, 4:1094. 1904. TYPE: Nicoya, Pcia. Guanacaste, *Pittier 13768* (P-Hb. Christ not seen Tryon photo).

TYPE: From material cultivated by Veitch originally from Colombia (K not seen Maxon photo).



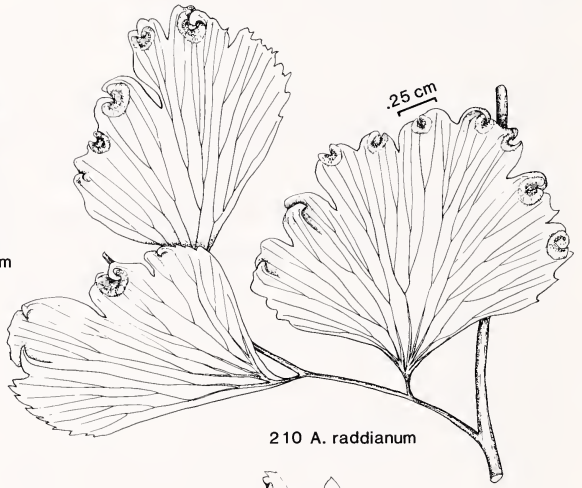
204 *A. patens*



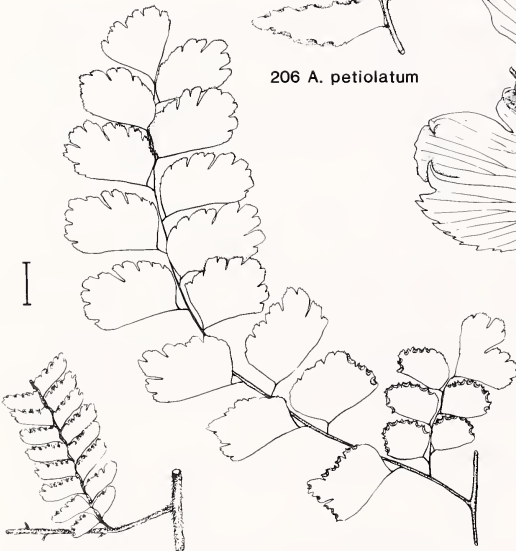
207 *A. poiretii*



206 *A. petiolatum*



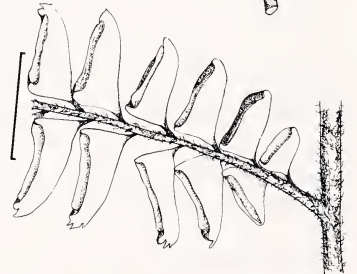
210 *A. raddianum*



205 *A. pectinatum*



208 *A. princeps*



209 *A. pulverulentum*

Plants epipetric or terrestrial, at 0–700(1100) m elevation, in forests and ravines, from the Peninsula de Nicoya, the Cordillera de Tilarán, the Pacific coastal plain of northern Costa Rica, the Meseta Central, Penonomé and vicinity, and the Canal Zone. Also from Mexico to Nicaragua, Colombia, and Venezuela.

This species may be difficult to distinguish from *A. tenerum*; the angle of the pinnule or segment base varies in both species. In Mexican specimens, the segments of *A. princeps* are larger than are those of *A. tenerum*, but this difference is less marked in Costa Rican material.

209. *Adiantum pulverulentum* L. Sp. Pl. 2:1096. 1753, var. *pulverulentum*.

Adiantum monosoratum Willd. Sp. Pl. ed. 4, 5:445. 1810. TYPE: Caracas, Distr. Fed., Venezuela, Bredemeyer (B-Hb. Willd. 20087 not seen Tryon photo fragm NY).

Adiantum umbrosum Willd. Sp. Pl. ed. 4, 5:447. 1810. TYPE: Caracas, Distr. Fed., Venezuela, Bredemeyer (B-Hb. Willd. 20090 not seen Tryon photo).

Adiantum apiculatum Schrad. Goett. Gel. Anz. 1824:872. 1824. TYPE: Brazil, Prince Maximilian zu Wied-Neuwied (M not seen). Synonymized by Christensen (Ind. Fil. 23. 1905).

Adiantum kunzeanum K. Presl, Tent. Pterid. 157. 1836. TYPE: Based on *A. pulverulentum* sensu Kunze, which is based on *A. monosoratum* Willd., and so based on the type of that name.

Adiantum pulverulentum var. *camptocarpon* Fée, Gen. Fil. [Mém. Foug. 5]:114. 1852. TYPE: "Habitat in America meridionali," collector unknown (Hb. Mougeot not seen).

Adiantum clausenii Fée, Gen. Fil. [Mém. Foug. 5]:115. 1852. TYPE: Novo Friburgo, Est. Rio de Janeiro, Brazil, Claussen (P not seen photo 2618).

Adiantum pulverulentum var. *biserratum* Hieron. Bot. Jahrb. Syst. 34:489. 1904, as "*biserrata*." SYNTYPES: Río Dagua, Buenaventura region, Depto. El Valle, Colombia, Lehmann 5027 (B not seen fragm NY); Mount Tolima, Depto. Tolima, Colombia, Mar 1882, Schmidtchen (B not seen); and near Tacares, Pcia. Alajuela, Nov 1854, Hoffmann (B not seen).

Adiantum pulverulentum var. *crenatoserratum* Hieron. Hedwigia 48:232. 1909, as "*crenatoserrata*." TYPE: Based on *A. monosoratum* Willd., and so based on the type of that name.

LECTOTYPE: Plate 47 of Plumier's "Description...," which is based on a specimen collected by Plumier on Hispaniola or Martinique, chosen by Proctor (Fl. Less. Antill. 2:185. 1977).

Plants terrestrial, at 0–1600(1800) m elevation, from throughout the moist to wet regions in the Flora area. Also from throughout tropical America.

Proctor (Ferns Jamaica 242. 1985) recognized *A. pulverulentum* var. *caudatum* Jenm. in Jamaica.

210. *Adiantum raddianum* K. Presl, Tent. Pterid. 158. 1836.

Adiantum cuneatum Langsd. & Fisch. Pl. Voy. Russes Monde 1:23, t. 26. 1810, non Forst., 1786, nom. illeg. TYPE: Ilha de Sta. Catarina, Est. Sta. Catarina, Brazil, Langsdorff (LE not seen Tryon photo not seen; isotypes B-Hb. Willd. 20096 not seen Tryon photo, BM not seen).

Adiantum cuneatum var. *angustifolium* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:70. 1842. SYNTYPES: Edo. Veracruz and Edo. Oaxaca, Mexico, Galeotti 6266 (BR not seen) and 6359 (BR not seen).

Adiantum tinctum T. Moore, Gard. Chron. 1862:932. 1862. TYPE: From material cultivated by Veitch, originally from Peru (K not seen Tryon photo not seen).

FIGS. 204–210. *Adiantum*. FIG. 204. Lamina of *A. patens*, Valerio 205. FIG. 205. Basal portion of basal pinnule of median pinna of *A. pectinatum*, Jiménez 835. FIG. 206. Median pinnae of *A. petiolatum*, Brade & Brade 319. FIG. 207. Pinnule of *A. poiretii*, Chrysler 5339. FIG. 208. Median pinna of *A. princeps*, Hinton 15883, Mexico. FIG. 209. Basal portion of median pinna of *A. pulverulentum*, Wercklé. FIG. 210. Pinnule of *A. raddianum*, Wercklé.

Adiantum colpodes T. Moore, Gard. Chron. 1865:530. 1865. TYPE: From material cultivated by Veitch, originally collected by Pearce in Ecuador (K-Hb. T. Moore not seen Tryon photo not seen).

Adiantum rubellum T. Moore, Gard. Chron. 1868:866. 1868. TYPE: From material cultivated by Veitch, originally from Bolivia (K not seen Tryon photo not seen).

Adiantum amabile T. Moore, Gard. Chron. 1868:1090. 1868, non Liebm., 1849, nom. illeg. TYPE: From material cultivated by Veitch, originally collected by Pearce in Peru (K not seen).

Adiantum decorum T. Moore, Gard. Chron. 1869:582. 1869. TYPE: From material cultivated by Veitch, originally collected by Pearce in Peru (K not seen Tryon photo not seen).

Adiantum wagneri Mett. ex Kuhn, Linnaea 36:77. 1869. TYPE: Mt. Pichincha, Pcia. Pichincha, Ecuador, *Wagner* (B? not seen).

Adiantum cuneatum var. *major* Baker in Mart. Fl. Bras. 1(2):594. 1870, as "*majus*." SYNTYPES: Lagoa Santa, Est. Minas Gerais, Brazil, *Warming* (K not seen); Caldas, Est. Minas Gerais, Brazil, *Regnell I 488* (K not seen); Est. Sta. Catarina, Brazil, *F. Mueller 249* (K not seen photo 11495).

Adiantum moorei Baker, Gard. Chron. 1873:811. 1873. TYPE: A renaming of *A. amabile* T. Moore, and so based on the type of that name.

Adiantum rufopunctatum Mett. ex Kuhn, Jahrb. Königl. Bot. Gart. Berlin 1:350. 1881. TYPE LOCALITY: Yungas, Bolivia. The type evidently is D'Orbigny 165 (B not seen; isotype P not seen Tryon photo not seen), according to Tryon (Contr. Gray Herb. 194:169. 1964).

Adiantum cuneatum var. *vastum* Rosenst. Hedwigia 43:217. 1904. TYPE: Toledo, Est. Sta. Catarina, Brazil, *Ulbricht 16* (S not seen).

Adiantum werckleanum Christ, Bull. Herb. Boissier II, 4:1093. 1904. TYPE: Costa Rica, *Wercklé* in 1903 (P-Hb. Christ not seen photo 2648).

Adiantum cuneatum f. *elongatum* Rosenst. Hedwigia 46:82. 1906, as "*elongata*." TYPE: Munic. Blumenau, Est. Sta. Catarina, Brazil, *Haerchen 2a* (S not seen).

Adiantum boliviense Christ & Rosenst. in Rosenst. Repert. Spec. Nov. Regni Veg. 5:230. 1908. TYPE: La Florida near Yanacachi, South Yungas, Depto. La Paz, Bolivia, 1600 m, *Buchtien 459* (S not seen; isotypes P not seen, UC, US).

Adiantum baenitzii Rosenst. Repert. Spec. Nov. Regni Veg. 5:230. 1908. TYPE: Sirupaya near Yanacachi, S. Yungas, Depto. La Paz, Bolivia, *Buchtien 462* (S not seen; isotype UC).

Adiantum cuneatum var. *subintegrum* Hieron. Hedwigia 48:240, t. 11, f. 14. 1909, as "*subintegra*." TYPE: Near Puracé, Depto. Cauca, Colombia, *Stuebel 112* (B not seen).

Adiantum decorum var. *quadripinnatum* Rosenst. Meded. Rijks-Herb. 19:8. 1913, as "*quadripinnata*." TYPE: Yungas of S. Mateo, Depto. Cochabamba, Bolivia, 1500 m, *Herzog 1995* (S not seen).

Adiantum remyanum Espinosa, Bol. Mus. Nac. Hist. Nat. 15:96, t. 3, 5g, 5h. 1936. TYPE: Based on *A. formosum* sensu Remy in Gay (Hist. Fis. Polit. Chile, Bot. 6:487. 1853), non R. Br., 1810, and so based on the type of that name, which is Topocalma, Chile, *Gay* (P not seen).

Adiantum cuneipinnulum Nair & Ghosh, Acta Bot. Indica 2:78. 1974, nom. superfl. TYPE: A renaming of *A. cuneatum* Langsd. & Fisch., and so based on the type of that name.

TYPE: A renaming of *A. cuneatum* sensu Raddi, and so based on t. 78, f. 2 of Raddi's "Plantarum Brasiliensium Nova Genera," which illustrates a specimen collected by Raddi on Mt. Estrella, Est. Rio de Janeiro, Brazil.

Plants terrestrial, at 1200–1900(2300) m elevation, from the Cordillera Central, the Fila de Cedral, and the Cordillera de Talamanca. Also from Jamaica, Hispaniola, the Lesser Antilles, Trinidad, Venezuela, Colombia to Bolivia, Brazil, Paraguay, and Uruguay.

211. *Adiantum seemannii* Hook. Sp. Fil. 2:5, t. 81A. 1851.

TYPE: S. Lorenzo, Pcia. Veraguas, *Seemann 1124* (K not seen Tryon photo).

Plants terrestrial, at 0–700 m elevation, in forests, from the Peninsula de Nicoya, the Cordillera de Tilarán, the Cordillera Central, the Meseta Central, the

Atlantic lowlands of Costa Rica and Panama, the Peninsula de Osa, the Pacific lowlands of Panama, and Bahía Solano (Depto. Chocó). Also from Mexico, Guatemala, Honduras, and Colombia.

Large, mature plants of this species may have either pinnate or 2-pinnate fronds. The pinnae of the pinnate fronds are larger than the pinnules of the 2-pinnate fronds.

212. *Adiantum serratodentatum* Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:445. 1810.

Adiantum obtusum Desv. Ges. Naturf. Freunde Berlin Mag. 5:327. 1811. TYPE: "Habitat in Guyana?," collector unknown (P not seen photo 2624).

Adiantum rhomboideum H.B.K. Nov. Gen. Sp. 1:20 (fol. 16). 1816, non Schkuhr, 1805, nom. superfl. et illeg. TYPE: A renaming of *A. serratodentatum* Humb. & Bonpl. ex Willd., and so based on the type of that name.

Adiantum bonplandii Desv. Mém. Soc. Linn. Paris 6:309. 1827. TYPE: A renaming of *A. rhomboideum* H.B.K., and so based on the type of that name.

Adiantum cassioides Desv. Mém. Soc. Linn. Paris 6:309. 1827. TYPE LOCALITY: "Habitat in America calidiori." No type was seen at P by Weatherby (Contr. Gray Herb. 114:17. 1936).

Adiantum proximum Gaud. in Freyc. Voy. Uranie Bot. 403. 1829. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Gaudichaud* (P not seen).

Adiantum obtusum var. *revolutum* Miq. Inst. Versl. Meded. Kon. Nederl. Inst. Wetensch. 1842:188. 1843. TYPE: Surinam, *Focke 611* (U not seen photo 197).

Adiantum kunzei Miq. Inst. Versl. Meded. Kon. Nederl. Inst. Wetensch. 1842:189, fig. 1843. TYPE: Para, Surinam, *Focke 86* (U not seen), seen by Kramer (Acta Bot. Neerl. 3:483. 1954).

Adiantum rhomboideum var. *laxum* Klotzsch, Linnaea 18:551. 1845. TYPE: Essequibo River, Guyana, *Rich. Schomburgk 266* (B not seen).

Adiantum rhomboideum var. *strictum* Klotzsch, Linnaea 18:551. 1845. SYNTYPES: Guanaguana, Edo. Monagas, Venezuela, *Moritz 46b* (B not seen); Plain of Aragua, Edo. Aragua, Venezuela, *Moritz 163* (B not seen); and Canuku Mountains, Guyana, *Rich. Schomburgk 1184* (B not seen).

Adiantum jacobinae Fée, Gen. Fil. [Mém. Foug. 5]:115. 1852. TYPE: Jacobina, Est. Bahia, Brazil, *Blanchet* (P not seen photo 2625).

Adiantum obtusum var. *majus* T. Moore, Ind. Fil. 32. 1857. SYNTYPES: St. Vincent, *Guilding* (K not seen); French Guiana, *Leprieur* (K not seen); Brazil, *Gardner 3350* (K not seen; isosyntype US); and Bay of Chocó, Depto. Nariño, Cauca, or Valle, Colombia, *Hinds* (K not seen).

Adiantum obtusum var. *microphyllum* Fée, Crypt. Vasc. Brésil 1:38. 1869. TYPE: Novo Friburgo, Est. Rio de Janeiro, Brazil, *Claussen* (P or RB not seen).

Adiantum rectangulare Lindm. Ark. Bot. 1:204, t. 9, f. 3. 1903, nom. superfl. TYPE: A renaming, in effect, of *A. kunzei* Miquel, and so based on the type of that name.

TYPE: Caripe, Edo. Monagas, Venezuela, *Humboldt 450* (B-Hb. Willd. 20088 not seen Tryon photo).

Plants terrestrial, at 0–500 m elevation, in thickets and forests, from Volcán Orosí (Pcia. Guanacaste), Buenos Aires (Pcia. Puntarenas), and lowland western Panama. Also from Trinidad, Venezuela, Colombia, Peru, Bolivia, and the Guianas.

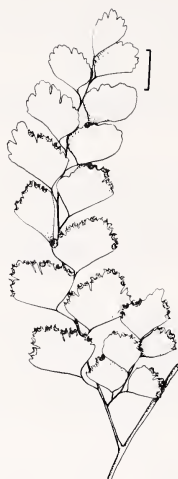
Kramer (Acta Bot. Neerl. 3:483. 1954) considered *A. kunzei* Miquel to be varietally distinct from *A. serratodentatum*, but the presence of intermediates makes this separation somewhat doubtful, in my opinion.

213. *Adiantum tenerum* Swartz, Nov. Gen. Sp. Pl. Prodr. 135. 1788.

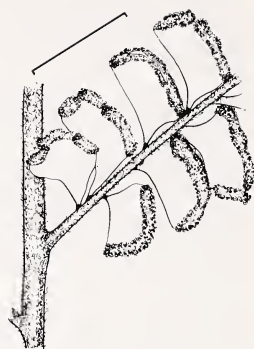
Adiantum tenerum var. *dissectum* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:71. 1842. TYPE: Mexico, *Galeotti 6361* (BR not seen).



211 *A. seemannii*



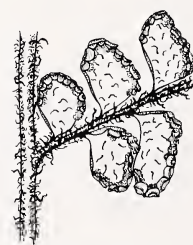
213 *A. tenerum*



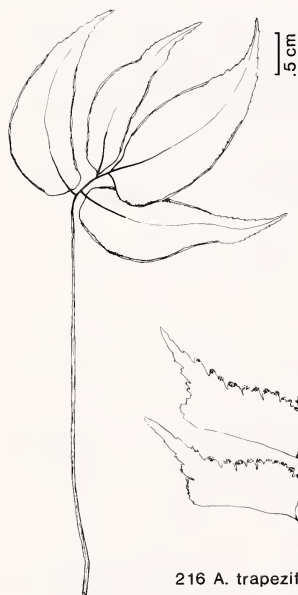
212 *A. serratodentatum*



215 *A. tetraphyllum*



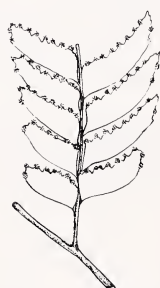
214 *A. terminatum*



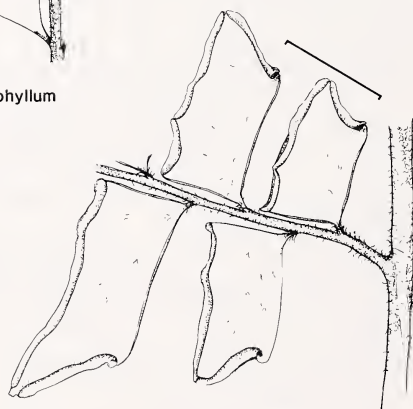
219 *A. wilsonii*



216 *A. trapeziforme*



217 *A. urophyllum*



218 *A. villosum*

Adiantum trapezoides Fée, Gen. Fil. [Mém. Foug. 5]:117. 1852. TYPE: Puente Nacional, Edo. Veracruz, Mexico, *Galeotti* 6317 (P not seen).

?*Adiantum extensum* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:72. 1857. SYNTYPES: Near Orizaba and Huatusco, Edo. Veracruz, Mexico, *Schaffner* 40 and 41 (P or RB neither seen).

Adiantum littorale Jenm. Ferns Brit. W. Ind. Guiana 96. 1899. TYPE: Jamaica, *Jenman* (NY not seen).

Adiantum tenerum var. *obtusissimum* Christ, Bull. Herb. Boissier II, 7:266. 1907. SYNTYPES: Navarro, Pcia. Cartago, 1100 m, *Wercklé* in 1905 (P not seen); and La Palma, Pcia. S. José, 1100 m, *Wercklé* in 1905 (P not seen).

TYPE: Jamaica, *Swartz* (S not seen Maxon photo; isotype B-Hb. Willd. 10097 not seen Tryon photo).

Plants terrestrial or epipetric, at 0–100 and 1000–1100 m elevation, from the Río Navarro 2 km west of the bridge at Troya (Pcia. Cartago), 2 km north of Puerto Limón (Pcia. Limón), near Guaniquito (Pcia. Los Santos), and Juan Díaz (Pcia. Panama). Also from Florida, the Antilles, Mexico to Honduras, Trinidad, and Venezuela.

For an additional comment on this species, see *A. princeps*. All occurrences of this species may be escapes, rather than naturalized or native populations.

214. *Adiantum terminatum* Kunze ex Miq. Inst. Versl. Meded. Kon. Nederl. Inst. Wetensch. 1842:187. 1843.

Adiantum hirtum Klotzsch, Linnaea 18:553. 1845, non Poir., 1810, nom. illeg. TYPE: Kanuku Mountains, Guyana, *Rich. Schomburgk* 1444 (K? not seen).

TYPE: Bergendaal, Surinam, *Focke* (U not seen).

Plants terrestrial, at ca. 100 m elevation, in the Flora area known only from the Finca Gebrueder Hundrisser, Pcia. Limón (*Brade & Brade* 746, NY). Also from Guatemala, Nicaragua, Venezuela, Colombia to Bolivia, Guyana, Surinam, and Brazil.

The indument of sparse hairs on the abaxial lamina surface in this species is exactly like that of *A. humile*; however, *A. terminatum* is a plant of smaller stature with smaller pinnules that are less glaucous on the abaxial surface.

215. *Adiantum tetraphyllum* Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:441. 1810.

Adiantum ternatum Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:436. 1810. TYPE: Caripe, Edo. Monagas, Venezuela, *Humboldt* 448 (B-Hb. Willd. 20075 not seen Tryon photo).

Adiantum acuminatum Desv. Ges. Naturf. Freunde Berlin Mag. 5:327. 1811. TYPE: Puerto Rico, *Ledru* (P not seen Weatherby photo).

Adiantum prionophyllum H.B.K. Nov. Gen. Sp. 1:20 (fol. 16). 1816, nom. superfl. TYPE: A renaming of *A. tetraphyllum* Humb. & Bonpl. ex Willd., and so based on the type of that name.

Adiantum tetraphyllum var. *microphyllum* Splitg. Tijdschr. Natuurl. Gesch. Physiol. 7:427. 1840. TYPE: Near Paramaribo, Surinam, *Splitgerber* (L not seen).

FIGS. 211–219. *Adiantum*. FIG. 211. Lamina apex of *A. seemannii*, Skutch 4673. FIG. 212. Basal portion of median pinna of *A. serratodentatum*, Hart 35. FIG. 213. Median pinna of *A. tenerum*, Burger & Ramirez 4107. FIG. 214. Basal portion of median pinna of *A. terminatum*, Cuatrecasas 7551, Colombia. FIG. 215. Median pinnules of *A. tetraphyllum*, Skutch 3633. FIG. 216. Median pinnules of basal pinna of *A. trapeziforme*, Alfaro 46. FIG. 217. Basal portion of median pinna of *A. urophyllum*, Seemann. FIG. 218. Basal portion of median pinna of *A. villosum*, Cornman 566. FIG. 219. Frond of *A. wilsonii*, Wedel 288.

?*Adiantum tetraphyllum* var. *macropterum* Kunze, Bot. Zeitung (Berlin) 3:284. 1845. TYPE: Caracas, Distr. Fed., Venezuela, *Moritz* (LZ destroyed?).

?*Adiantum prionophyllum* var. *curtum* T. Moore, Ind. Fil. 35. 1857. SYNTYPES: Pcia. Esmeraldas, Ecuador, *Seemann* (K not seen); and Fernando Póo, *Vogel* (K not seen).

?*Adiantum prionophyllum* var. *subcoriaceum* T. Moore, Ind. Fil. 35. 1857. TYPE: Guadeloupe, *L'Herminier* 4 (K not seen).

Adiantum falcatum Vell. Fl. Flumin. 11:t. 96. 1831; Arq. Mus. Nac. Rio de Janeiro 5:455. 1881, non Swartz, 1802, nom. illeg. TYPE LOCALITY: Vicinity of Rio de Janeiro, Est. Rio de Janeiro, Brazil.

Adiantum tetraphyllum var. *subsimplex* Christ in Krug in Urban, Bot. Jahrb. Syst. 24:95. 1897. SYNTYPES: Grenada, *Eggers* 6141b (P not seen) and 6469 (P not seen photo 2638).

Adiantum tetraphyllum var. *costaricense* Christ in Pitt. Prim. Fl. Costaric. 3(1):19. 1901. TYPE: Tuís, Pcia. Cartago, 670 m, *Tonduz* 11313 (BR or P not seen; isotype US).

LECTOTYPE: Near Guanaguana and Caripe, Edo. Monagas, Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 20082-2 not seen Tryon photo), chosen by *Lellinger* (Proc. Biol. Soc. Wash. 89:704. 1977).

Plants terrestrial, at 0–1600 m elevation, in forests and ravines, from throughout the Flora area. Also throughout tropical America.

This species is often confused with *A. fruticosum*.

216. *Adiantum trapeziforme* L. Sp. Pl. 2:1097. 1753.

Adiantum rhomboideum Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 2:114, t. 122. 1805. TYPE: Plate 59 of Sloane's "Voyage...", which is based on a specimen from Jamaica.

Adiantum eminens K. Presl, Tent. Pterid. 158. 1836. TYPE: Based on *A. trapeziforme* sensu K. Presl (Reliq. Haenk. 1:63. 1826), non L., and so based on the type of that name, which is Panama, *Haenke* (PRC not seen fragm NY).

Adiantum formosissimum Klotzsch, Linnaea 18:556. 1845, nom. superfl. TYPE: A renaming of *A. rhomboideum* Schkuhr, which was cited in synonymy, and so based on the type of that name.

Adiantum trapeziforme var. *oblongatum* T. Moore, Ind. Fil. 40. 1857. TYPE: Cordillera de Veracruz, Edo. Veracruz, Mexico, *Galeotti* 6338 (K? not seen).

Adiantum trapeziforme var. *plumieri* T. Moore, Ind. Fil. 40. 1857. TYPE: Near Veracruz, Edo. Veracruz, Mexico, *Linden* 70 (K? not seen).

LECTOTYPE: Plate 59 of Sloane's "Voyage...", chosen by *Lellinger* (Proc. Biol. Soc. Wash. 89:704. 1977).

Plants terrestrial, at 0–300(1100) m elevation, from the northern and central Pacific lowlands of Costa Rica and S. Pedro de S. Ramón (Pcia. Alajuela). Also from Cuba, Jamaica, the Lesser Antilles, and Mexico to Nicaragua.

217. *Adiantum urophyllum* Hook. Sp. Fil. 2:24, t. 84B. 1851.

Adiantum pilosum Baker, Ann. Bot. (London) 5:207. 1891, non Fée, 1852, nom. illeg. TYPE: Ocaña to Pamplona, Depto. Norte de Santander, Colombia, *Kalbreyer* 956 (K not seen Tryon photo).

Adiantum kalbreyeri C. Chr. Ind. Fil. 28. 1905. TYPE: A renaming of *A. pilosum* Baker, and so based on the type of that name.

Adiantum orosiense Christ, Repert. Spec. Nov. Regni Veg. 8:17. 1910. SYNTYPES: Valverde Finca, Orosi, Pcia. Cartago, *Brade & Brade* 16816 (P-Hb. Christ not seen Tryon photo); and Carrillo, Pcia. S. José, 400 m, *Brade & Brade* 314 (P not seen).

SYNTYPES: Gorgona Island, Colombia, *Barclay* (K not seen), *Hinds* (K not seen); and Salango, Pcia. Guayas, Ecuador, *Seemann* (K not seen).

Plants terrestrial, at (200)900–1500 m elevation, in forests, from the Atlantic slopes of the Cordillera Central, between S. Isidro del General and Dominical (Pcia. S. José), the Cordillera de Talamanca near Boquete, near Sta. Fé (Pcia.

Veraguas), and the Mojarras de Tadó and the Río Calima (Depto. Chocó). Also from Venezuela and Colombia to Peru.

218. *Adiantum villosum* L. Syst. Nat. ed. 10, 2:1328. 1759.

Adiantum falcatum Swartz, J. Bot. (Schrader) 1800(2):82. 1801, non Buchoz, 1785, nom. illeg. LECTOTYPE: Plate 55, f. 1, of Sloane's "Voyage...", chosen by Proctor (Ferns Jamaica 17. 1984), which is based on a specimen from Jamaica. Buchoz's name (Jard. Univ. t. 158. 1785) may prove to be a nom. nud. if the illustration lacks an analysis showing essential characters.

Pteris dolabriformis Poir. Encyc. Méth. 5:722. 1804. TYPE: Santo Domingo, collector unknown (holotype or fragm P not seen photo 2645).

Adiantum monotis Nees, Linnaea 19:684. 1847. TYPE: Mexico, *Aschenborn* 348 (B? not seen).

Adiantum lanceolatum Fée, Gen. Fil. [Mém. Foug. 5]:115. 1852. TYPE: French Guiana, *Leprieur* (Hb. Mougeot not seen).

Adiantum villosum var. *macrosorum* T. Moore, Ind. Fil. 42. 1857. TYPE: Trinidad, *Lockhart* (K not seen).

Adiantum obliquetruncatum Fée, Hist. Foug. Antill. [Mém. Foug. 11]:18, t. 7, f. 3. 1866. SYNTYPES: Guadeloupe, *L'Herminier* (P or RB not seen; isotype P not seen photo 2646); and Trinidad, *Germain* in 1862 (P or RB not seen).

NEOTYPE: Near Spanish Town, Jamaica, *Sloane*, (BM-Hb. Sloane not seen), chosen by Proctor (Fl. Less. Antill. 185. 1977). No specimen of *A. villosum* currently is extant in the Linnaean Herbarium. The specimen labelled "Adiant A villosum" in the hand of Linnaeus (LINN 1252.10 not seen microfiche S. I. Library), which usually is cited as the type, is *A. pulverulentum*; according to Jackson's "Index" it was added after 1755, and so cannot be a type.

Plants terrestrial, at 0–700 m elevation, in forests and ravines, from the Peninsula de Nicoya, the western slopes of the Cordillera de Tilarán and the Cordillera Central, Caldera (Pcia. Puntarenas), the Atlantic coastal plain near Limón (Pcia. Limón), around Sta. Fé (Pcia. Veraguas) and Penonomé, and central Panama. Also from the Antilles, Mexico to Nicaragua, Trinidad and Tobago, Venezuela, Colombia, and Brazil.

One specimen (*Maxon* 5757, US) with atypical pinnules and discontinuous sori may be a hybrid with *A. obliquum*.

219. *Adiantum wilsonii* Hook. Sp. Fil. 2:6, t. 72A. 1851.

Adiantum wilsonii var. *semicordatum* Rosenst. Repert. Spec. Nov. Regni Veg. 22:6. 1925. TYPE: Llanuras de S. Carlos, Pcia. Alajuela, 200 m, *Brade & Brade* 473 (S not seen; isotypes NY, UC, US).

TYPE: Near Bath, Jamaica, *Wilson* (K not seen Tryon photo).

Plants terrestrial, at 0–800 m elevation, in forests, from the Atlantic coastal plain of Costa Rica and Panama, the Canal Zone and adjacent Pcia. Panama, Cerro Tacarcuna and central Pcia. Darién, and the northern half of the Chocó. Also from the Greater Antilles, Mexico to Belize, Nicaragua, and Colombia.

Rosenstock's variety refers to the large form with four or five pairs of lateral pinnae. This variant is scattered throughout the range of the species, but in Central America it is predominantly in the southern portion of the range. There seem to be no substantial characters to separate it from var. *wilsonii*.

VITTARIACEAE

Rhizomes bearing abundant, crowded roots, the roots densely covered with long, matted root hairs, the rhizomes erect to long-creeping, scaly, the scales narrowly lanceolate, often long-attenuate at the apex, concolorous or nearly so, strongly clathrate; fronds minute to small, usually lax, thin, and often pendent; stipes terete to flattened, often obsolete, not articulate; laminae less than 0.5 m long, simple, often linear or nearly elliptic, entire (lacerate at the apex in *Hecistopteris*), lacking sclerenchyma but with inconspicuous spicular cells present in the epidermis; veins free and divergent or parallel, or anastomosing in long, polygonal areolae lacking free included veinlets; sori surficial to submarginal; indusia absent; sporangia superficial or immersed in shallow to deep grooves associated with the veins, rather short-stalked, mixed with paraphyses or the paraphyses wanting; spores monolete or trilete.

BENEDICT, R. C. 1911. The genera of the fern tribe Vittarieae, their external morphology, venation, and relationships. *Bull. Torrey Bot. Club* 38:153–190, t. 2–8.

1. Sporangia acrostichoid, scattered over the abaxial surface of the elliptic to oblanceolate, lax laminae.

34. *Anetium*

1. Sporangia in discrete lines following the veins, often in grooves..2.

2(1). Laminae irregularly forked or lacerate at the apex, less than 5 cm long.

35. *Hecistopteris*

2(1). Laminae entire, more than (5)10 cm long..3.

3(2). Sori in several lines or in rows following the polygonal areolae on each side of the midrib.

33. *Antrophyum*

3(2). Sori in a single marginal or submarginal line on each side of the midrib..4.

4(3). Areolae in two or more series parallel to the midrib on each side of the midrib; stipes and midribs at the base green or stramineous.

36. *Ananthacorus*

4(3). Areolae in a single series oblique to the midrib on each side of the midrib; stipes and midribs at the base green or blackish.

37. *Vittaria*

33. ANTROPHYUM Kaulf.

Plants epiphytic; rhizomes short-creeping, the roots bearing brownish, matted root hairs, scaly, the scales distinctly clathrate, blackish, sometimes brownish, sometimes blackish with brownish margins, often with an extended, filiform apex; fronds small to medium-sized; stipes narrowly alate or obsolete; laminae simple, linear to narrowly rhombic, narrowly ovate, or narrowly obovate, often attenuate at the base, acute or acuminate at the apex, firmly herbaceous to subcoriaceous or even fleshy; midribs narrow to wide, absent or obscure toward the frond apex in some species; veins reticulate in long, polygonal areolae without included veinlets, with short, free, marginal veins in some species, immersed in the lamina tissue; sori elongate on the veins, forming lines or discontinuous polygons, superficial or immersed in grooves, exindusiate; sporangia long-stalked, mixed with branched-clavate paraphyses in *A. ensiforme*, otherwise lacking paraphyses.

Tropical and subtropical, mostly in the Old World; ca. 50 species, including those often included in *Polytaenium*.

BENEDICT, R. C. 1907. The genus *Antrophyum*—I. Synopsis of subgenera, and the American species. *Bull. Torrey Bot. Club* 34:445–458. 1907.

TRYON, R. M., Jr. 1964. Taxonomic fern notes. IV. Some American vittarioid ferns. *Rhodora* 66:110–117.

1. Paraphyses present among the sporangia; spores monolet; soral lines diverging at a 30°–60° angle to the midrib. Laminae nearly linear, ca. 10 times longer than wide, 10–35 cm long, 10–25(30) cm wide; stipes obsolete; midribs prominulous only in the proximal 2/3–4/5 of the lamina.

223. *A. ensiforme*

1. Paraphyses absent among the sporangia; spores trilete; soral lines parallel to the midrib or diverging up to 30° from the midrib..2.

2(1). Sporangia in (1)2–3(4) long, simple lines on each side of and parallel to the midrib, always in rather deep grooves. Laminae linear, 7–42 cm long, (1)2–11 mm wide; stipes obsolete; midribs blackish at the base, pale and prominulous to the frond apex.

226. *A. lineatum*

2(1). Sporangia in (2)4–10 series of short, angular lines or polygonal areolae on each side of and not parallel to the midrib (except predominantly parallel in *A. lanceolatum*), either in shallow grooves or superficial..3.

3(2). Longitudinal axes of the areolae predominantly parallel to the midrib. Laminae linear, 6–31 cm long, (5)7–13(15) mm wide, attenuate at the base, acuminate at the apex; stipes obsolete; midribs pale and prominulous throughout.

225. *A. lanceolatum*

3(2). Longitudinal axes of the areolae predominantly oblique to the midrib..4.

4(3). Soral lines all superficial; areolae mostly obtuse at the ends; marginal veins mostly or all free, not united to form marginal areolae, lacking hydathodes; stipes obsolete..6.

4(3). Soral lines slightly sunken; areolae mostly truncate at the ends; marginal veins mostly anastomosing in short areolae, with few or no free marginal veinlets, lacking hydathodes; stipes obsolete or not. Rhizome scales with a long, filiform apex; midribs prominulous nearly to the frond apex..5.

5(4). Laminae narrowly to rarely broadly oblanceolate, widest distal to the middle, strongly alate to the base, the ala wider than the width of the stipe. Laminae (6)10–38 cm long, 1.5–3.5(4.5) cm wide; stipes obsolete; frond margins decidedly revolute at maturity.

221. *A. cajenense*

5(4). Laminae narrowly elliptical, widest at the middle, scarcely alate to the base, the ala narrower than the width of the stipe. Laminae 7–31 cm long, (1.5)2–5 cm wide; stipes obsolete or nearly so; frond margins slightly or not revolute at maturity.

224. *A. guayanense*

6(4). Laminae elliptic-lanceolate; midribs prominulous only in the proximal 1/3(2/3) of the laminae. Laminae 9–31 cm long, 2.5–4.5 cm wide.

220. *A. anetioides*

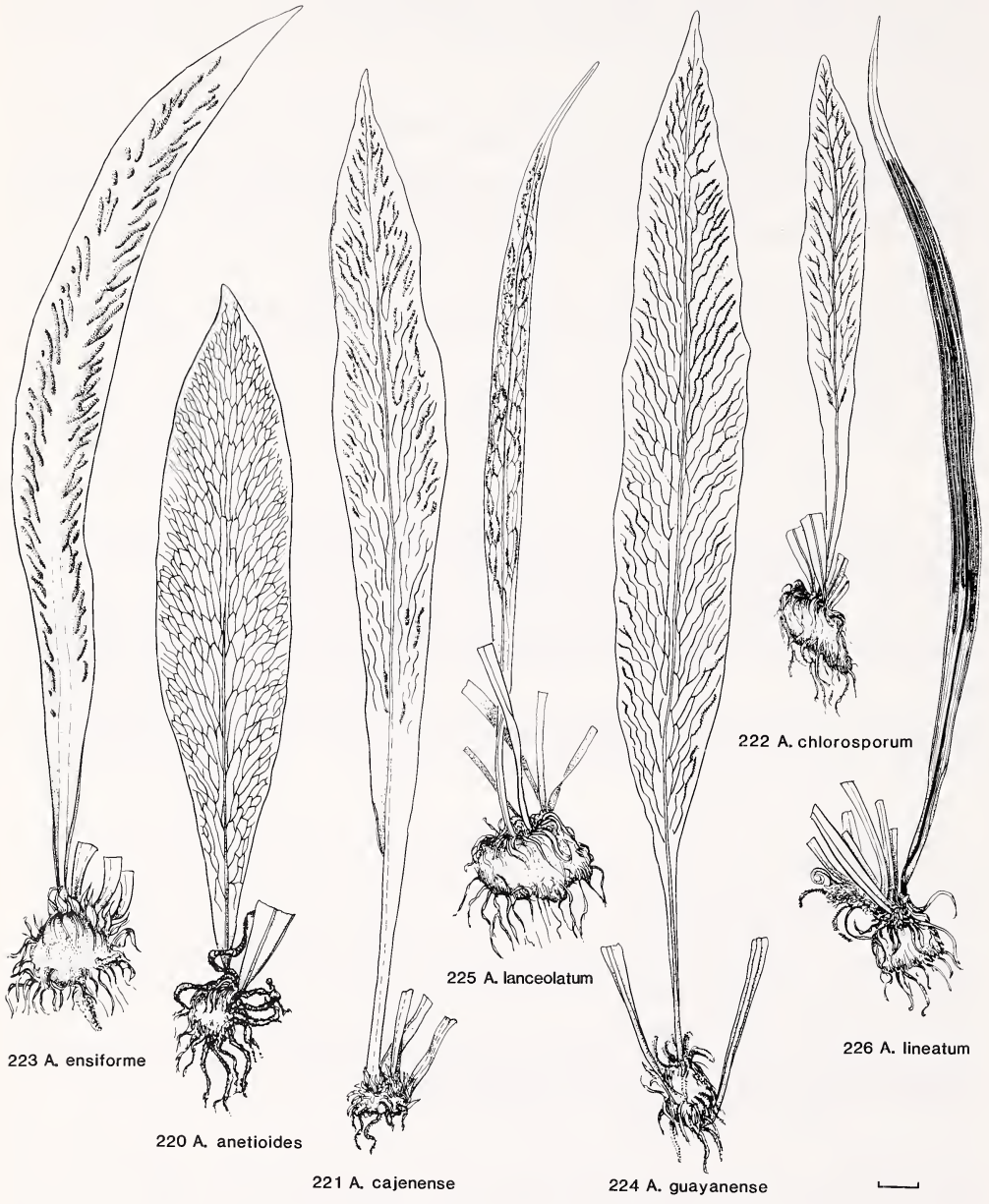
6(4). Laminae oblong or narrowly oblanceolate; midribs prominulous in the proximal 9/10(2/3) of the lamina. Laminae (3)6–20 cm long, 1.2–3(3.5) cm wide.

222. *A. chlorosporum*

220. Antrophyum anetioides Christ, Bull. Herb. Boissier II, 5:12. 1905.

LECTOTYPE: Río Las Vueltas, Tucurrique, Pcia. Cartago, 635 m, *Tonduz* 12757 (P not seen; isotypes NY not seen, US), chosen by Benedict (Bull. Torrey Bot. Club 34:455. 1907).

Plants epiphytic, at 500–700 m elevation, in forests, from the valley of the Río Reventazón.



221. *Antrophyum cajenense* (Desv.) Spreng. Syst. Veg. ed. 16,4:67. 1827.

Hemionitis cajenensis Desv. Ges. Naturf. Freunde Berlin Mag. 5:311. 1811. TYPE: French Guiana, collector unknown (P-Hb. Desv. not seen photo 3597; possible isotype [French Guiana, J. Martin] B-Hb. Willd. 19560 not seen microfiche S. I. Library).

Antrophyum discoideum Kunze, Bot. Zeitung (Berlin) 6:702. 1848. LECTOTYPE: Colombia, Karsten 30 (B not seen Tryon photo GH not seen), chosen by Tryon (Rhodora 66: 112. 1964).

Antrophyum subsessile var. *elongatum* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:208 (repr. 290). 1864, as "*elongata*." LECTOTYPE: Based on *Antrophyum discoideum* Kunze, and so based on the lectotype of that name.

Antrophyum lacantunense Rovirosa, Pteridogr. Sur México 240, t. 38A, f. 10–11. 1910. TYPE: Río Lacanjá, Edo. Chiapas, Mexico, Martinez (Hb. Rovirosa 1097 not seen; isotype GH).

Plants epiphytic, at 0–1700 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Atlantic coastal plain of Costa Rica and Panama, the Cordillera de Talamanca, the vicinity of S. Isidro del General, the Fila Costeña near S. Vito, the Peninsula de Osa, and the northern part of the Chocó. Also from Cuba, Jamaica, Mexico, Guatemala, Honduras, Nicaragua, Venezuela, Colombia to Bolivia, Surinam, and Brazil.

222. *Antrophyum chlorosporum* Mickel & Beitel, Pterid. Fl. Oaxaca 41, f. 42K,L. 1988.

TYPE: Ridge between Yetzelalag and Lovani, Edo. Oaxaca, Mexico, 3600–5800 ft, Hallberg 1546 (NY not seen; isotype UC).

Plants epiphytic, at 1300–1700 m elevation, from the Cordillera Central, the vicinity of Tapantí, and the Cordillera de Talamanca near the Panama border (Pcia. Limón). Also from Mexico.

223. *Antrophyum ensiforme* Hook. in Benth. Pl. Hartw. 73. 1841.

Antrophyum falcatum Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:49, t. 12. 1842, non Blume, 1828, nom. illeg. TYPE: Llano Verde, Edo. Oaxaca, Mexico, Galeotti 6385 (BR not seen).

Antrophyum camosum Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:161 (repr. 9). 1849. TYPE: A renaming of *Antrophyum falcatum* Martens & Galeotti, and so based on the type of that name.

Antrophyum galeottii Fée, Hist. Antroph. [Mém. Foug. 4]:51, t. 5, f. 4. 1852. TYPE: Comatlepec, Edo. Oaxaca, Mexico, Galeotti 6385 (BR not seen).

TYPE: Mt. Totontepeque, Edo. Oaxaca, Mexico, 10000 ft, Hartweg 522 (K not seen).

Plants epiphytic, at (700)1000–2500 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Cerro Tablazo, Cerro Carpintera, the northern end of the Cordillera de Talamanca, and around Cerro Punta and Boquete. Also from Mexico to Nicaragua.

224. *Antrophyum guayanense* Hieron. Hedwigia 57:212. 1915.

LECTOTYPE: Trinidad, Fendler 151 (B not seen; isoelectotype US), chosen by Tryon (Rhodora 66:113. 1964).

FIGS. 220–226. *Antrophyum*. FIG. 220. Plant of *A. anetioides*, Tonduz 12757. FIG. 221. Plant of *A. cajenense*, Alfaro 75. FIG. 222. Plant of *A. chlorosporum*, Standley 37897. FIG. 223. Plant of *A. ensiforme*, Lellinger 1673. FIG. 224. Plant of *A. guayanense*, Lellinger & de la Sota 420. FIG. 225. Plant of *A. lanceolatum*, de la Sota 5229. FIG. 226. Plant of *A. lineatum*, Maxon 315.

Plants epiphytic, at 100–300 m elevation, in forests, in the Flora area known only from the Mojarras de Tadó, 8.5 km east of Istmina, Depto. Chocó (*Lellinger & de la Sota* 420, COL, CR, HUA, LP, US). Also from Trinidad, Venezuela, Colombia to Peru, Guyana, French Guiana, and Brazil.

225. *Antrophyum lanceolatum* (L.) Kaulf. Enum. Fil. 198. 1824.

Hemionitis lanceolata L. Sp. Pl. 2:1077. 1753, non *Polytaenium lanceolatum* (Swartz) Desv., 1827. TYPE: Plate 127C of Plumier's "Traité...", which illustrates a plant collected by Plumier on St. Vincent.

Antrophyum feei Schaffn. ex Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:42, t. 22, f. 1. 1857. TYPE: Near Huatusco, Edo. Veracruz, Mexico, *Schaffner* 133 (P or RB not seen; isotype K not seen).

Antrophyum stenophyllum Rovirosa, Pteridogr. Sur México 242. 1910, non Baker, 1898, nom. illeg. TYPE: Cerro de Moyos, Río Lacanjá region, Edo. Chiapas, Mexico *Martinez* (Hb. Rovirosa 1104 not seen).

Plants epiphytic, at 0–700(1400) m elevation, in forests, from the Cordillera de Tilarán, Vara Blanca (Pcia. Heredia), the Atlantic coastal plain of Costa Rica, the Peninsula de Osa, the Canal Zone, and Alto del Buey. Also from the Antilles, Mexico, Guatemala, Honduras, Nicaragua, Trinidad, Colombia, Ecuador, Surinam, French Guiana, and Brazil.

226. *Antrophyum lineatum* (Swartz) Kaulf. Enum. Fil. 199. 1824, var. *lineatum*.

Hemionitis lineata Swartz, Nov. Gen. Sp. Pl. Prodr. 129. 1788, non *Vittaria lineata* (L.) J. E. Smith, 1793. TYPE: Jamaica, *Swartz* (SBT not seen; isotype B-Hb. Willd. 20033 not seen microfiche S. I. Library).

Vittaria lanceolata Swartz, Ges. Naturf. Freunde Berlin Neue Schriften 2:133, t. 7, f. 2. 1799. TYPE: A renaming of *Hemionitis lineata* Swartz, and so based on the type of that name.

Plants epiphytic, at 0–2400 m elevation, in forests, from the Cordillera Central, Cerro Tablazo, Cerro Carpintera, the Cordillera de Talamanca, near Sta. Fé, near El Valle, and the Canal Zone and adjacent Panama. Also from the Greater Antilles, Mexico, Guatemala, Belize, Nicaragua, Venezuela, Colombia to Bolivia, Brazil, and Argentina.

Panamanian specimens from near sea level are very small. Proctor (Amer. Fern J. 72:114. 1982) has distinguished specimens from Jamaica as *Polytaenium lineatum* var. *intramarginale* (Baker ex Jenm.) Proctor.

34. ANETIUM Splitg.

Plants epiphytic; rhizomes long-creeping, slender, clothed with roots bearing abundant, brownish, matted root hairs and abundantly scaly, the scales dark brown, iridescent, clathrate; fronds small; stipes short to obsolete; laminae distant, simple, elliptic to oblanceolate, nearly attenuate at the base, acute to acuminate at the apex, papyraceous to herbaceous; midribs narrow, not extending to the lamina apex; veins reticulate in long, polygonal areolae without included veinlets, but with short, free, marginal veins scarcely or not hidden in the lamina tissue; sporangia superficial, scattered mostly along but also between the veins, not organized into sori, exindusiate; sporangia long-stalked.

New World lowland tropics; monotypic.

227. *Anetium citrifolium* (L.) Splitg. Tijdschr. Natuurl. Gesch. Physiol. 7:395. 1840.

Acrostichum citrifolium L. Sp. Pl. 2:1067. 1753. TYPE: Plate 116 of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique.

Hemionitis parasitica L. Syst. Nat. ed. 10, 2:1322. 1759. TYPE: Jamaica, Browne, a specimen labelled "Hemionitis A parasitica" in the hand of Solander (LINN 1248.2 not seen microfiche S. I. Library).

Antrophyum pendulum LePrieur in Fée, Hist. Anthroph. [Mém. Foug. 4]:51. 1852. SYNTYPES: French Guiana, LePrieur 1830 (P or RB not seen) and 1859 (P or RB not seen).

Plants epiphytic, at 0–700 m elevation, in forests, from the Cordillera de Tilarán, the valley of the Río Reventazón, the Atlantic lowlands of Costa Rica and Panama, the Peninsula de Osa, the Canal Zone, and the foot of Alto del Buey and near La Teresita (Depto. Chocó). Also from Jamaica, Hispaniola, Puerto Rico, the Lesser Antilles, Mexico to Honduras, Nicaragua, Trinidad and Tobago, Venezuela, Colombia, Peru, Bolivia, the Guianas, and Brazil.

35. HECISTOPTERIS J. Smith

Plants epiphytic; rhizomes erect or ascending, minute, borne at intervals along long-creeping, proliferous roots bearing conspicuous root hairs, densely scaly, the scales dark brown, clathrate; fronds very small; stipes obsolete; laminae simple, roughly spatulate, glabrous, irregularly forked or lacerate at the apex, the lobes somewhat lacerate; veins free, flabellate; sori elongate, superficial on the veins in the middle portion of the lobes, exindusiate; sporangia short-stalked, mixed with reddish-brown, multicellular, catenate paraphyses.

New World tropics; monotypic.

228. *Hecistopteris pumila* (Spreng.) J. Smith, London J. Bot. 1:193. 1842.

Gymnogramme pumila Spreng. Tent. Suppl. Syst. Veg. ed. 16. 31. 1828. TYPE: Surinam, Weigelt (LZ destroyed; isotype B not seen; probable isotype UC).

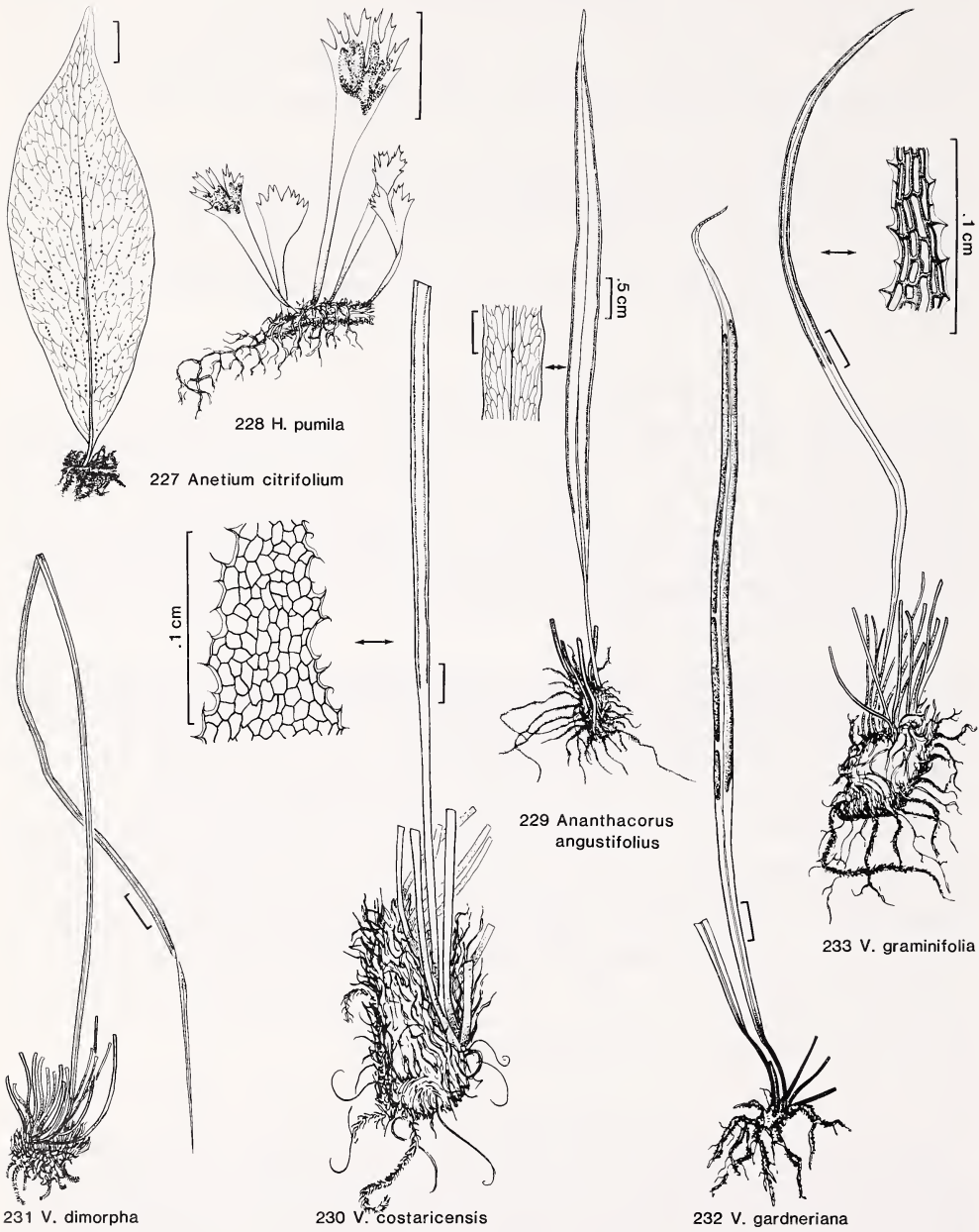
Hecistopteris pumila var. *obtusa* Maxon & Morton, Bull. Torrey Bot. Club 765: 75:76. 1948. TYPE: Tafelberg Creek, Saramacca River headwaters, Surinam, Maguire 24101 (NY).

Plants epiphytic, at 0–300(1000) m elevation, in forests, from Volcán Arenal, the Atlantic coastal plain of Costa Rica and Panama, near S. Isidro del General, the Peninsula de Osa and vicinity, the Canal Zone and adjacent areas, and the northern part of the Chocó. Also from the Antilles, Mexico to Honduras, Trinidad, Venezuela, Colombia to Peru, Surinam, French Guiana, and Brazil.

Christ (Hedwigia 44:366. 1905) named three subspecies of *H. pumila*, but the names are all illegitimate because they were proposed in binomial form, contrary to the "International Code of Botanical Nomenclature."

36. ANANTHACORUS Underw. & Maxon

Plants epiphytic; rhizomes short-creeping, densely clothed with roots bearing abundant, brownish, matted root hairs, scaly, the scales brown or rarely blackish, clathrate; fronds medium-sized; stipes approximate, nearly exalate, often nearly obsolete; laminae simple, linear, glabrous, coriaceous, the margins plane to subrevolute, the midrib prominent to the frond apex on the abaxial surface of the laminae; veins obscure, anastomosing, forming elongate, polygonal areolae without included veinlets in a few series on each side of the midrib; sporangia forming a continuous, submarginal coenosorus in a shallow groove along a



marginal commissural vein, exindusiate; sporangia short-stalked, mixed with reddish-brown, branched-clavate paraphyses.

MAXON, W. R. 1908. A new genus allied to *Vittaria*. Contr. U. S. Natl. Herb. 10:486–487.

New World tropics; monotypic, but related closely to *Vittaria*.

229. *Ananthacorus angustifolius* (Swartz) Underw. & Maxon, Contr. U. S. Natl. Herb. 10:487. 1908.

Pteris angustifolia Swartz, Nov. Gen. Sp. Pl. Prodr. 129. 1788, non *Vittaria angustifolia* Blume, 1828. TYPE: Probably Jamaica, Swartz (S not seen; cf. Fl. Ind. Occ. 3:1599. 1806).

Vittaria costata Kunze, Linnaea 9:77. 1834. TYPE: Tocache, Huallaga, Depto. S. Martín, Peru, June 1830, Poeppig (LZ destroyed; isotype W not seen).

Plants epiphytic, at 0–1000(2100) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Atlantic coastal plain of Costa Rica and Panama, the valley of the Río Reventazón, the Peninsula de Osa, northwest of Sta. Fé, the Canal Zone and vicinity, S. José Island (Pcia. Panama), near Cana, and the Río Ciego, Cabo Corrientes, the Río Truando, and the Río Baudo (all Depto. Chocó). Also from throughout tropical America.

This species resembles *Vittaria remota*, but has thicker laminae with the venation more hidden and with several series of areolae between the midrib and the frond margin and parallel to the midrib. This genus differs from *Vittaria* in having areolate venation that is akin to the venation of *Antrophyum*.

37. VITTARIA J. E. Smith

Plants epiphytic; rhizomes erect or short-creeping, covered with roots bearing conspicuous, abundant, brownish root hairs, scaly at the apex, the scales lanceolate, strongly clathrate, often iridescent; fronds mostly medium-sized; stipes short to obsolete, blackish or pale at the base; laminae simple, narrow, linear in most species, pendent, mostly firmly herbaceous to coriaceous; midribs mostly prominulous; veins forming a single series of usually oblique areolae between the midrib and the margin, immersed in the lamina tissue; sori forming a single submarginal line on each side of the midrib, in a shallow to deep groove, exindusiate; sporangia long-stalked, mixed with paraphyses.

Tropics and subtropics, mostly in the Old World; ca. 50 species.

BENEDICT, R. C. 1914. A revision of the genus *Vittaria* J. E. Smith. I. The species of the subgenus *Radiovittaria*. Bull. Torrey Bot. Club 41:391–410.

TRYON, R. M., Jr. 1964. Taxonomic fern notes. IV. Some American vittarioid ferns. Rhodora 66:110–117.

1. Laminae (2.5)3–17 mm wide; stipes brown or black toward the base; soral paraphyses bulbous or swollen at the apex, not twisted; rhizomes radial, the fronds arising from all sides..5.

1. Laminae 1–2.5(3.5) mm wide; stipes pale toward the base; soral paraphyses slender to clavate, usually twisted; rhizomes flattened, the fronds all arising from the sides..2.

FIGS. 227–233. *Anetium*, *Hecistopteris*, *Ananthacorus*, and *Vittaria*. FIG. 227. Plant of *Anet. citrifolium*, Lankester. FIG. 228. Plant of *H. pumila*, Lellinger 687. FIG. 229. Plant and lamina venation of *Ananth. angustifolius*, Mickel 3342. FIG. 230. Plant and rhizome scale detail of *V. costaricensis*, Standley & Valerio 44805. FIG. 231. Plant of *V. dimorpha*, Maxon 60. FIG. 232. Plant of *V. gardneriana*, Maxon 5676. FIG. 233. Plant and rhizome scale detail of *V. graminifolia*, Svenson 330.

2(1). Rhizome scales ca. 0.75–1 mm (8–20 cells) wide, the central cells 1.5–3 times longer than wide..4.

2(1). Rhizome scales ca. 0.25–0.5 mm (4–6 cells) wide, the central cells 2–10 times longer than wide. Rhizome scales with all clathrate walls of equal thickness, blackish in mass; stipes obsolete or nearly so; laminae 1–2.5 mm wide, 15–60 cm long; paraphyses slender, often branched with the branches linear to slightly clavate, tan to reddish brown..3.

3(2). Spores monolete.

234. *V. lineata*

3(2). Spores trilete.

231. *V. dimorpha*

4(2). Laminae 1–2.5 mm wide, usually strongly revolute at maturity; central cells of the rhizome scales strongly clathrate, often the walls of the marginal cells less clathrate than those of the central ones; rhizome scales several cells wide to the apex or with a short tip 1 cell wide, grayish or dark golden brown in mass. Stipes obsolete or nearly so; laminae 6–30 cm long, paraphyses stout, distinctly clavate, becoming spoon-shaped by collapse of the terminal cell, reddish-brown or darker; spores trilete.

233. *V. graminifolia*

4(2). Laminae 3–3.5 mm wide, slightly revolute at maturity; central cells of the rhizome scales weakly and evenly clathrate throughout; rhizome scales 1 cell wide at and proximal to the apex, reddish-brown in mass. Stipes obsolete; laminae ca. 60 cm long, the midrib prominulous toward the base, obscure distally, the soral line supramedial; paraphyses slender, slightly clavate; spores monolete.

230. *V. costaricensis*

5(1). Fronds 3–6 cm long, 4–8 mm wide, narrowly oblanceolate, exstipitate, membranaceous; soral lines medial.

235. *V. minima* & a + 20V

5(1). Fronds 8–70 cm long, 3–17 mm wide, linear to narrowly elliptic, short- to long-stipitate, papyraceous; soral lines submarginal..6.

6(5). Laminae (8)10–17 mm wide, linear to narrowly elliptic, the areolae oblique to the midrib. Rhizome scales several cells wide nearly throughout, narrowly lanceolate, ca. 1–2 mm long, 0.3–0.5 mm wide; stipes 0.5–2 cm long; midribs prominulous.

236. *V. remota*

6(5). Laminae (3)4–8 mm wide, linear, the areolae more or less parallel to the midrib..7.

7(6). Rhizome scales 1 cell wide except at the base, almost hair-like. Rhizome scales ca. 1–3 mm long, 0.1 mm wide; stipes 2–6 cm long; fronds 20–60(75) cm long, 3–8 mm wide; midribs not prominulous.

237. *V. stipitata*

7(6). Rhizome scales several cells wide nearly throughout, linear to lanceolate..8.

8(7). Rhizome scales narrowly lanceolate, ca. 2–3 mm long, 0.25–0.5 mm wide, appearing toothed, the end walls of marginal cells laterally produced; stipes 0.2–1.5 cm long; fronds 10–20(30) cm long, (3)4–7 mm wide; midribs not or scarcely prominulous.

232. *V. gardneriana*

8(7). Rhizome scales linear, ca. 2–5 mm long, 0.2–0.3 mm wide, nearly entire; stipes 5–8 cm long; fronds 15–60 cm long, 4–6 mm wide; midribs not prominulous.

235a. *V. moritziana*

230. *Vittaria costaricensis* Lellinger, Proc. Biol. Soc. Wash. 98:389, t. 18. 1985.

TYPE: El Silencio near Tilarán, Pcia. Guanacaste, ca. 750 m, Standley & Valerio 44805 (US).

Plants epiphytic, at 700–800 m elevation, in forests, known only from the type.

231. *Vittaria dimorpha* K. Muell. Bot. Zeitung (Berlin) 12:547, t. 13, f. 3. 1854.

Vittaria bradeorum Rosenst. Repert. Spec. Nov. Regni Veg. 22:18. 1925. TYPE: Tablazo, Pcia. S. José, *Brade & Brade 165 p. p.* (S not seen photo 6104; isotypes NY, UC).

TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede 791* (B not seen; isotype NY not seen).

Plants epiphytic, at (0)600–2300 m elevation, in forests, from Cerro Tablazo, the vicinity of Cartago, the Río Matina (Pcia. Limón), and the vicinity of Boquete. Also from Mexico, Guatemala, El Salvador, and Nicaragua.

This species seems to differ from *V. lineata* only in having trilete, rather than monolete, spores, and so its status as an independent species needs to be investigated.

232. *Vittaria gardneriana* Fée, Hist. Vittar. Pleurogr. [Mém. Foug. 3]:15, t. 3, f. 1. 1852.

Vittaria karsteniana Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:207 (repr. 289). 1864. LECTOTYPE: San Pedro, Pcia. Ocaña, Colombia, *Schlim 318* (B not seen; islectotype US), chosen by Lellinger (Mem. New York Bot. Gard. 23:18. 1972).

Vittaria gracilis Moritz ex Kuhn, Linnaea 36:67. 1869. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Moritz 464* (B not seen; isotype L not seen photo 2366).

Vittaria bommeri Christ, Bull. Herb. Boissier II, 5:11. 1905. SYNTYPES: Costa Rica, *Wercklé 217* (P not seen); and the valley of the Río Socio, Costa Rica, *Pittier 576a* (P not seen).

Vittaria gardneriana var. *stenolepis* Rosenst. Hedwigia 46:149. 1907. SYNTYPES: Joinville, Est. Sta. Catarina, Brazil, *E. O. Mueller 3a* (S not seen); and Pirabeiraba, Est. Sta. Catarina, Brazil, *Schmalz 41.1* (S not seen).

LECTOTYPE: Organ Mountains, Est. Rio de Janeiro, Brazil, *Gardner 147* (BM not seen; islectotypes B not seen, US), chosen by Benedict (Bull. Torrey Bot. Club 41:401. 1914).

Plants epiphytic, at 1400–2000 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, above Boquete, and the Serranía de Pirre (Pcia. Darién). Also from Hispaniola, Venezuela, Colombia to Peru, and Brazil.

233. *Vittaria graminifolia* Kaulf. Enum. Fil. 192. 1824.

Vittaria filifolia Fée, Hist. Vittar. Pleurogr. [Mém. Foug. 3]:20, t. 3, f. 6. 1852. LECTOTYPE: Guadeloupe, *L'Herminier* (P-Hb. Cosson not seen; islectotype NY not seen), chosen by Tryon (Rhodora 66:114. 1964).

?*Vittaria setacea* Christ, Bull. Herb. Boissier II, 6:47. 1906. TYPE: Navarro, Pcia. Cartago, *Wercklé* in 1905 (presumably P-Hb. Christ not seen photo 22050; presumable isotypes B, NY neither seen).

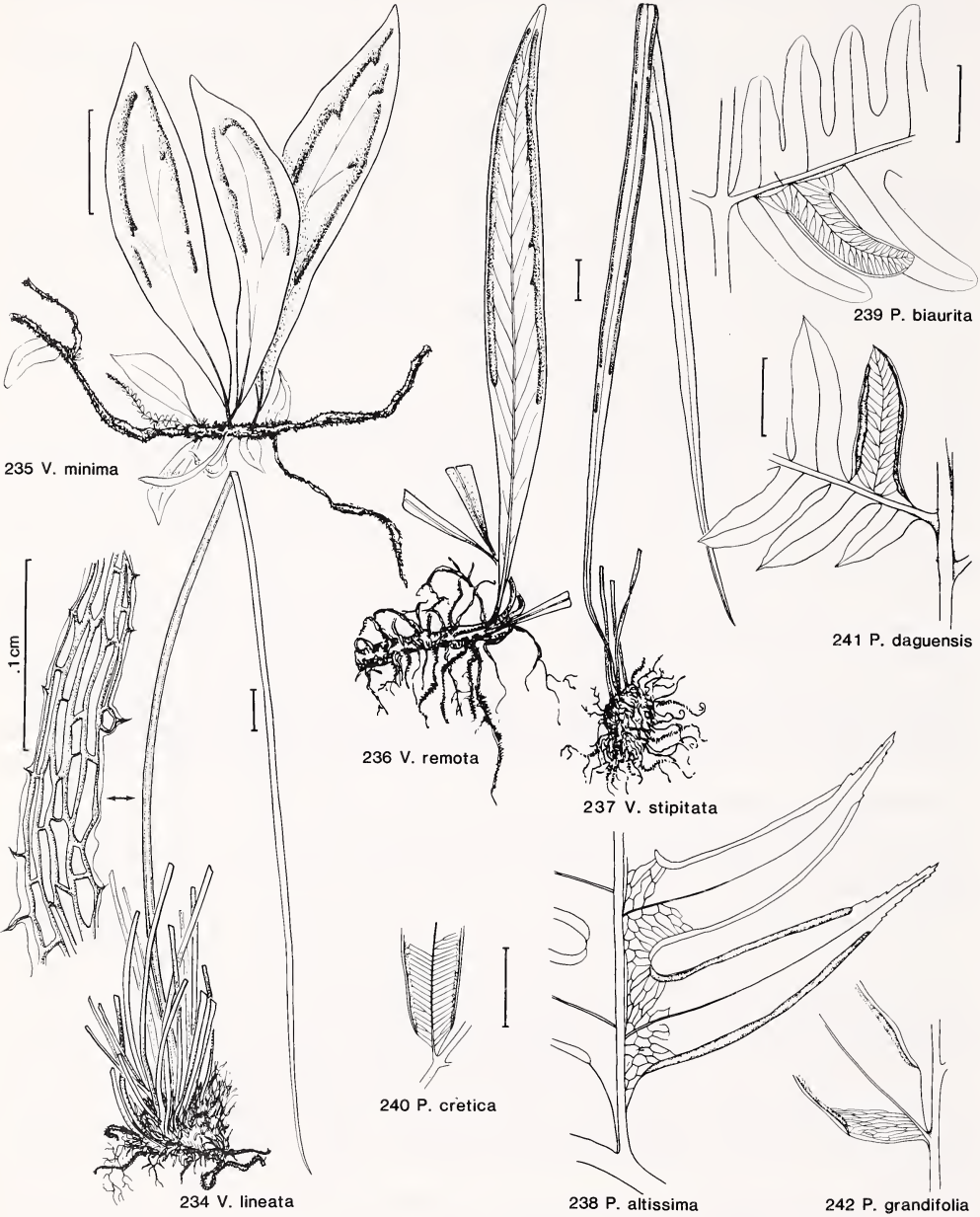
TYPE: Brazil, *comm. Kaulfuss* in 1827 (LZ destroyed; isotype E not seen), examined by Tryon (Contr. Gray Herb. 194:215. 1964).

Plants epiphytic, at 0–2900 m elevation, in forests, from Monteverde, Alajuela (Pcia. Alajuela), the Cordillera Central, the Atlantic coastal plain of Costa Rica, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, Barro Colorado Island (Canal Zone), Cana, and Bahía Solano. Also from throughout tropical America.

Vittaria setacea may be a synonym of *V. lineata*; cf. Mickel & Beitel (Pterid. Fl. Oaxaca 400. 1988).

234. *Vittaria lineata* (L.) J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:421. 1793.

Pteris lineata L. Sp. Pl. 2:1073. 1753. LECTOTYPE: Plate 143 of Plumier's "Traité...", which illustrates specimens from Hispaniola, chosen by Tryon (Contr. Gray Herb. 194:213. 1964).



Vittaria filiformis Cav. Descr. Pl. 270. 1801. TYPE: Peru, *Née* (MA not seen photo US).

Vittaria angustifrons Michx. Fl. Bor.-Amer. 2:261. 1803. TYPE: Asiahatcha River, Florida, *Michaux* (P not seen photo 3356; isotypes B-Hb. Willd. 20025-2 not seen Tryon photo, P-Hb. Juss. Cat. 1351 not seen photo 3107).

Vittaria schkuhrii Raddi, Pl. Bras. Nov. Gen. 1:51. 1825. TYPE: Corcovado, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Vittaria costata Kunze, Linnaea 9:77. 1834; *Analecta Pteridogr.* 29, t. 18, f. 2. 1837. TYPE: Misión Tocache, upper Río Huallaga, Depto. S. Martín, Peru, June 1830, *Poeppig* (LZ destroyed).

Vittaria deppeana K. Muell. Bot. Zeitung (Berlin) 12:547. 1854. TYPE: Jalapa, Edo. Veracruz, Mexico, *Schiede* 790 (B not seen fragm NY not seen; isotype NY not seen).

Vittaria pachydictyon K. Muell. Bot. Zeitung (Berlin) 12:547, t. 13, f. 4. 1854. TYPE: Surinam, *Weigelt* (B not seen).

Plants epiphytic, at 0–3300 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Atlantic coastal plain of Costa Rica and Panama, the Cordillera de Talamanca to Villa Mills (Depto. Cartago), Golfo Dulce (Pcia. Puntarenas), the Canal Zone, around Porto Bello (Pcia. Colón), S. José Island (Pcia. Panama), near Cana, and La Teresita (Depto. Chocó). Also from throughout tropical America.

235. *Vittaria minima* (Baker) Bened. Bull. Torrey Bot. Club 38:164. 1911.

Antrophyum minimum Baker, Ann. Bot. (London) 5:488. 1891. TYPE: Mountains of Costa Rica, 4000–5000 ft, *Endres* in 1869 (K not seen fragm NY).

Antrophyum werckleanum Christ, Bull. Herb. Boissier II, 5:11. 1905. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen fragm NY).

Plants epiphytic, at 900–1900 m elevation, in forests, from the Cordillera Central, Cerro Carpinera, the vicinity of S. Isidro del General, the Fila Costeña near S. Vito de Java, and the Fortuna dam site (Pcia. Chiriquí). Also from Nicaragua.

235a. *Vittaria moritziana* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:207 (repr. 289). 1864.

TYPE: Canoas [Canaos, Depto. Cundinamarca], Colombia, 2500 m, *Lindig* 219 (B not seen).

Plants epiphytic, at 2300–2400 m elevation, in forests, in the Flora area known only from the ridge above the Río Terbi, Valle de Silencio, Cordillera de Talamanca, Pcia. Limón (*Davidse et al.* 28730, UC). Also from Hispaniola and Venezuela to Bolivia.

236. *Vittaria remota* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:26, t. 20, f. 1. 1857.

TYPE: Pcia. Ocaña, Colombia, *Schlim* 611 (RB not seen).

Plants epiphytic, at 0–1700 m elevation, in forests, from the Cordillera Central, Guápiles (Pcia. Limón), the upper Río Reventazón valley, near Sta. Fé, La Mesa

FIGS. 234–242. *Vittaria* and *Pteris*. FIG. 234. Plant and rhizome scale detail of *V. lineata*, Lellinger 711. FIG. 235. Plant of *V. minima*, Lellinger 817. FIG. 236. Plant of *V. remota*, de la Sota 5236. FIG. 237. Plant of *V. stipitata*, Valerio 157. FIG. 238. Basal portion of pinna of *P. altissima*, de la Sota 5188. FIG. 239. Basal portion of pinna of *P. baurita*, Pittier 7009. FIG. 240. Basal portion of pinna of *P. cretica*, Heyde & Lux 3215, Guatemala. FIG. 241. Basal portion of pinna of *P. daguensis*, Lellinger & de la Sota 660. FIG. 242. Basal portion of pinna of *P. grandifolia*, Biolley fil. 17389.

and Cerro Pilón (Pcia. Coclé), Cerro Jefe, Cerro Pirre, Cerro Mali (Pcia. Darién), Alto del Buey, the Río Calima, and the Río Nuquí (Depto. Chocó). Also from Jamaica, Hispaniola, Puerto Rico, Guatemala, and Venezuela to Bolivia.

This species resembles *Ananthacorus angustifolius*, but has thinner laminae with the veins slightly obvious and only one series of areolae between the midrib and the frond margin. According to D. R. Farrar (pers. comm.), young fronds of *A. angustifolius* are distinctly reddish, whereas those of *V. remota* are not; this distinction may be of generic significance.

237. *Vittaria stipitata* Kunze, *Linnaea* 9:77. 1834.

TYPE: Pampayacu, Depto. Huánuco, Peru, *Poeppig Diar.* 1121 (LZ destroyed; isotype P not seen), seen by Tryon (Contr. Gray Herb. 194:215. 1964).

Plants epiphytic, at 0–1700 m elevation, in forests, from the Cordillera Central, Finca La Selva (Pcia. Heredia), the valley of the Río Reventazón, the valley of the Río General, the Fila Costeña near S. Vito de Java, the valley of the Río Dos Bocas near Sta. Fé, around Porto Bello (Pcia. Colón), Cerro Jefe, the Serranía de Pirre (Pcia. Darién), Alto del Buey, and the lower Río S. Juan. Also from Cuba, Jamaica, Hispaniola, Guatemala, Nicaragua, Venezuela, Colombia to Bolivia, and Brazil.

PTERIDACEAE

Rhizomes stout, short-creeping, ascending, or erect, scaly, the scales linear-lanceate to lanceolate, concolorous to bicolorous; fronds medium- to large-sized, monomorphic to slightly or greatly dimorphic; stipes usually thick, commonly sulcate; laminae oblong (or pedate in some species of *Pteris*), pinnate (to 3(4)-pinnate-pinnatifid in some species of *Pteris*), glabrous or thinly pilose, the margins often thickened; veins free and commonly forked, anastomosing only in a series of narrow, costal areolae, or completely anastomosing without included veinlets; sori borne over the abaxial surface of the pinnae (*Acrostichum*), confined to a submarginal band (*Neurocallis*), or along a submarginal commissural vein and protected by the commonly scarious, reflexed frond margins (*Pteris*); sporangia long-stalked, the capsules globular; paraphyses present; spores trilete.

1. Fronds greatly dimorphic, the fertile longer than the sterile and with much narrower pinnae; sori in a submarginal band.

39. *Neurocallis*

1. Fronds monomorphic or slightly dimorphic, the fertile fronds with somewhat narrower pinnae or segments; sori acrostichoid or submarginal..2.

2(1). Sori acrostichoid; fronds pinnate, the fertile pinnae apical or borne on separate fronds from the fertile ones.

40. *Acrostichum*

2(1). Sori marginal; fronds 1–3(4)-pinnate.

38. *Pteris*

38. PTERIS L.

Plants terrestrial, occasionally weedy; rhizomes stout, short-creeping to erect, often woody, bearing scales at the apex, the scales lanceate or lanceolate, concolorous, brownish, the margins entire; fronds medium- to large-sized; stipes scaly at the base, mostly brown, often thick, commonly sulcate; laminae 1–3(4)-pinnate-pinnatifid, often oblong, sometimes distinctly pedate or the basal pinnae only slightly basiscopically elaborated, firmly herbaceous to coriaceous, usually pale green, glabrous or sometimes sparsely hairy, the margins often thickened, the axes sulcate adaxially and often remotely spiny on the ridges; veins free, partially anastomosing (with costal areolae), or totally anastomosing without included veinlets; sori elongate on a submarginal commissural vein, in most species not extending to the segment apices or the sinuses between segments, protected by the reflexed, commonly scarious frond margin; sporangia long-stalked; paraphyses present.

Tropics and subtropics world-wide; ca. 250 species.

SCAMMAN, E. 1961. The genus *Pteris* of Costa Rica. *Rhodora* 63:194–205.

1. Supra-basal pinnae lobed with 2 or more lobes, pinnatifid or more divided..3.

1. Supra-basal pinnae absent, entire, or with a single, basiscopic lobe, otherwise narrowly linear, not pinnatifid or more divided..2.

2(1). Veins anastomosing toward the pinna margin; fronds usually at least 1 m long; pinnae all simple, unlobed, 15–45 cm long, 2–3 cm wide, acute or round at the base, acuminate at the apex.

242. *P. grandifolia*

2(1). Veins entirely free; fronds usually less than 1 m long; at least the basal pinnae lobed or more divided (or the laminae merely ternate); supra-basal pinnae 10–20 cm long, 1–2 cm wide, decurrent at the base, serrate-acuminate at the apex.

240. *P. cretica*

3(1). Veins anastomosing, at least along the pinnule costules..8.

3(1). Veins entirely free..4.

4(3). Fronds not or scarcely pedate, the basal pinnae only pinnatifid beyond the basal pinnules..6.

4(3). Fronds decidedly pedate, the basal pinnae pinnate-pinnatifid beyond the basal pinnules..5.

5(4). Segments round or with blunt teeth, not mucronate; fronds herbaceous, dark green. Laminae up to ca. 50 cm long, 30 cm wide; basal pinnae 2–3-pinnate-pinnatifid, strongly inequilateral; distal pinnae pinnatifid, 2–3 cm wide.

244. *P. muricella*

5(4). Segments usually mucronate, the midrib prolonged into the segment apex; fronds coriaceous, gray-green. Laminae up to ca. 100 cm long, 50 cm wide; basal pinnae 2–3-pinnate-pinnatifid, strongly inequilateral; distal pinnae pinnatifid, 3–4 cm wide.

243. *P. muricata*

6(4). Veins all arising from the pinnule costules, none from the pinna costae running to the sinuses between the pinnules. Laminae 15–100 cm long; basal pinnae bipartite; distal, pinnatifid pinnae 3–4 cm wide, often caudate; segments adnate.

250. *P. plumula*

6(4). Veins not all arising from the pinnule costules, some from the pinnae costae running to the sinuses between the pinnules..7.

7(6). Lateral pinnae 1–3(5) pairs; apical pinnae about as long as the subtending lateral ones; stipes minutely and distantly spiny; sinuses between the segments mostly symmetrical. Fronds ca. 0.5–1 m long.

251. *P. pungens*

7(6). Lateral pinnae (except in juveniles) 5–7 pairs; apical pinnae 2–3 times longer than the subtending lateral ones; stipes smooth; sinuses between the segments mostly asymmetrical. Fronds ca. 0.5–1.5 m long.

247. *P. paucinervata*

8(3). Veins free, 1-forked, except for the narrow, uniarcuate areolae along the costae between the costules. Laminae 0.5–1.5 m long, 0.25–0.4 m wide, pinnate-pinnatifid, except the basal pinnae with a prolonged, pinnatifid, basiscopic lobe.

239. *P. biaurita*

8(3). Veins partially or completely anastomosing, in addition to the narrow or wide, uni- or polyarcuate areolae along the costae between the costules..9.

9(8). Costal areolae 1 between the costules (uniarcuate)..12.

9(8). Costal areolae 2–4(6) between the costules (polyarcuate), often with 1 long and 1 or 2 short areolae..10.

10(9). Costae and costules spiny on the abaxial surface; laminae dark green. Laminae up to 0.5 m long, 0.2 m wide; apical pinnae similar to the narrowly ovate-lanceolate, subtending lateral pinnae; veins anastomosing in 1 or 2 series.

246. *P. obscura*

10(9). Costae and costules not spiny on the abaxial surface; laminae gray-green..11.

11(10). Lateral pinnae (except the basal and occasionally the suprabasal ones) 5–10(15) cm wide, up to 30 cm long, linear-lanceolate, with up to ca. 12(18) pairs of distant, falcate segments.

238. *P. altissima*

11(10). Lateral pinnae (except the basal ones) 2.5–3.5 cm wide, up to 25 cm long, linear-lanceolate, with up to ca. 18 pairs of crowded, falcate segments.

241. *P. daguensis*

12(9). Ultimate segments (2)5–10 cm long (less in apical portions); rachises and costae sometimes sparingly spiny. Laminae pedate, up to 3 m long, 1.5 m wide, sparsely pilosulous abaxially, especially on the veins.

245. *P. navarrensis*

12(9). Ultimate segments less than 3 cm long; rachises and costae not spiny..13.

13(12). Fronds 2(3)-pinnate-pinnatifid, slightly pedate with the basal basiscopic pinnule usually only pinnatifid; fronds up to 1(1.25) m long. Fertile segments mostly with a single row of areolae along the costule.

249. *P. polita*

13(12). Fronds at least 4-pinnate-pinnatifid at the base, decidedly pedate with the basal basiscopic pinnule 2-pinnate-pinnatifid; fronds up to 2 m long..14.

14(13). Veins (and sometimes the laminae) sparsely pilose on the abaxial surface; sterile segments toothed; ultimate segments usually mucronate, falcate; indusia usually continuous around the round sinuses.

248. *P. podophylla*

14(13). Veins and laminae glabrous on the abaxial surface; sterile segments entire; ultimate segments usually round, not falcate; indusia usually discontinuous, only approaching the acute to obtuse sinuses.

252. *P. tripartita*

238. *Pteris altissima* Poir. Encyc. Méth. 5:722. 1804.

Pteris macroptera Link, Hort. Reg. Bot. Berol. 2:32. 1833. TYPE: Based on material received from Brazil and cultivated in the botanical garden in Berlin (B not seen). See Morton (Contr. U. S. Natl. Herb. 38:72. 1967).

Pteris kunzeana J. Agardh, Recens. Sp. Pterid. 62. 1839. TYPE: Based on *P. podophylla* sensu Kunze, excluding all synonymy, and, therefore, on Pampayacu, Depto. Huánuco, Peru, *Poeppig* Diar. 1137 (LZ destroyed); and Mission Tocache, Río Huallaga, Depto. S. Martín, Peru, July 1830, *Poeppig* (LZ destroyed).

Pteris elata J. Agardh, Recens. Sp. Pterid. 63. 1839. TYPE: Panama, *Cuming* 1267 (K not seen fragm NY; isotype GH).

Pteris arborescens Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:54. 1842. TYPE: Chinantla, Edo. Oaxaca, Mexico, *Galeotti* 6375 (BR not seen). Several isotypes labelled *P. arborescens* and bearing number 6375 corrected to 6376 are truly the latter number and are isotypes of *Litobrochia mexicana* Fée, which is a synonym of *P. pulchra* Schlechtend. & Cham.

Pteris protea Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd., V, 1:228 (repr. 76). 1849. TYPE: Between Colipa and Misantla, Edo. Veracruz, Mexico, *Liebmann* 757 (C not seen fragm US; isotypes GH not seen Tryon photo, K not seen).

Litobrochia grandis Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:75. 1857. SYNTYPES: Barranca de S. Francisco, near Mirador, Edo. Veracruz, Mexico, *Schaffner* 144 (RB not seen); Cuba, *Morelet* (P or RB not seen); and Hispaniola, *de Tussac* (P or RB not seen).

Pteris schiedeana Ettingsh. Farnkr. Jetztw. 99, f. 52–54, t. 65, f. 9., t. 66, f. 1. 1864. TYPE: none cited.

TYPE: Puerto Rico, *LeDru* in 1797 (P-Hb. Lam. not seen Tryon photo; isotype P-Hb. Juss. 1315 not seen photo 3083).

Plants terrestrial, at 0–2000 m elevation, at forest margins, along trails, and sometimes in open areas, from throughout the Flora area. Also from the Antilles, Central America, Venezuela to Bolivia, Surinam, and Brazil.

See *P. podophylla* for a comment on a presumed hybrid with that species.

239. *Pteris biaurita* L. Sp. Pl. 2:1076. 1753.

Litobrochia galeottii Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:75. 1857. TYPE: Oaxaca and Teotalingo, Edo. Oaxaca, Mexico, *Galeotti* 6485 (RB not seen).

Pteris biaurita var. *subpinnatifida* Jenm. Bull. Bot. Dept. Jamaica 41:7. 1893; Ferns Brit. W. Ind. Guiana 123. 1900. TYPE: Jamaica, *Jenman* (NY? not seen).

LECTOTYPE: Plate 14 of Plumier's "Description...", chosen by Proctor (Fl. Less. Antill. 2:145. 1977).

Plants terrestrial, at 0–1100 m elevation, in open areas in forests, from the Atlantic and Pacific coastal plains of Costa Rica, the valley of the Río General, between S. Felix and the Cerro Colorado copper mine (Pcia. Chiriquí), El Valle, and near Pacora (Pcia. Panama). Also from the Antilles, Mexico to Nicaragua, Venezuela to Peru, Guyana, and Brazil.

240. *Pteris cretica* L. Mant. Pl. 130. 1767.

Pteris triphylla Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:51, t. 14, f. 1. 1842, non J. Agardh, 1839. TYPE: Jalapa, Edo. Veracruz, Mexico, *Galeotti* 6393 (BR not seen photos 5119, 5120).

Pteris trifoliata Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:114. 1857. TYPE: A renaming of *P. triphylla* Martens & Galeotti, and so based on the type of that name.

TYPE: Crete, *collector unknown* (LINN 1246.7 not seen microfiche S. I. Library), according to Tryon (Contr. Gray Herb. 194:192. 1964).

Plants terrestrial, at 1600–1900 m elevation, in open areas, often among rocks, from La Banderilla and Reventado (Pcia. Cartago), and from Chilibre (Pcia. Panama). Also from the southeastern United States, the Bahamas, Jamaica, Mexico, Guatemala, Peru, Brazil, and Argentina.

This Old World species is widely escaped in the New World.

241. *Pteris daguensis* (Hieron.) Lellinger, Amer. Fern J. 67:59. 1977.

Pteris orizabae var. *daguensis* Hieron. Bot. Jahrb. Syst. 34:495. 1904. TYPE: Banks of the Río Dagua, Depto. El Valle, Colombia, 200–500 m, *Lehmann* 8933 (B not seen; isotype US).

Plants terrestrial, at 0–100 m elevation, in disturbed forests and waste places, in the Flora area known only from near Loma del Cuchillo, Depto. Chocó (*Lellinger & de la Sota* 660, COL, CR, HUA, LP, US). Also from adjacent areas in Colombia.

242. *Pteris grandifolia* L. Sp. Pl. 2:1073. 1753.

Pteris socorrensis Karst. Fl. Columb. 1(3):118, t. 58. 1860. TYPE: Near Socorro and Chaparral, Depto. El Valle, Colombia, 800–1100 m, *Karsten* (LE not seen Tryon photo).

Pteris grandifolia var. *campanae* Rosenst. Repert. Spec. Nov. Regni Veg. 7:291. 1909. TYPE: Mt. Campana near Tarapoto, Depto. S. Martín, Peru, *Spruce* 4668 (S not seen; isotype K not seen).

LECTOTYPE: Plate 105 of Plumier's "Traité...", chosen by Proctor (Fl. Less. Antill. 2:143. 1977). Although Linnaeus cited t. 106 in error for t. 105, he also cited t. 8 of Plumier's "Description...", which is identical with t. 105. Both plates are based on a specimen collected by Plumier on Hispaniola.

Plants terrestrial, at 0–600(1500) m elevation, in wet forests, from La Palma and the Atlantic and Pacific lowlands of Costa Rica and Panama. Also from Florida, the Antilles, Trinidad, Mexico to Nicaragua, Venezuela, and Colombia to Peru.

243. *Pteris muricata* Hook. Sp. Fil. 193, t. 123B. 1858.

TYPE: Depto. Antioquia or Cundinamarca, Colombia, *Jervise* (K not seen).

Plants terrestrial, at 1300–3000 m elevation, along streams and in forests, often in open areas, from the Cordillera Central, Cerro Carpintera, and the Cordillera de Talamanca. Also from Mexico, Guatemala, Nicaragua, and Colombia to Bolivia.

244. *Pteris muricella* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:73. 1857.

Pteris mollis Bommer & Christ, Bull. Herb. Boissier 4:658. 1896. TYPE: S. Marcos, Pcia. S. José, 1355 m, *Tonduz* 7565 (BR not seen; isotypes P not seen Tryon photo, US).

SYNTYPES: Near Córdoba and Huatusco, Edo. Veracruz, Mexico, *Schaffner* 143 (RB not seen) and 1854 (P or RB not seen).

Plants terrestrial, at 1000–2600 m elevation, in forests and in open areas, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico, Guatemala, El Salvador, Nicaragua, and Venezuela.

245. *Pteris navarrensis* Christ, Bull. Soc. Bot. Genève II, 1:227. 1909.

TYPE: Valley of the Río Navarro, Pcia. Cartago, 1400 m, *Wercklé* 16761 (P not seen; isotype US).

Plants terrestrial, at 1000–2700 m elevation, in forests and at forest margins, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí.

This variable species may have aculeate axes at high elevations and may be identical to *P. livida* Mett. var. *livida*, but probably not to var. *ferox* Mett.

246. *Pteris obscura* Mett. ex Kuhn, Linnaea 36:90. 1869.

TYPE: Venezuela, *Funck & Schlim* 599 (B not seen).

Plants terrestrial, at 1300–1400 m elevation, in forests, in the Flora area known only from Cerro Pirre (*Goldman* 1890, US). Also from Colombia.

247. *Pteris paucinervata* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:73. 1857.

TYPE: Barranca de S. Martín, near Mirador, Edo. Veracruz, Mexico, *Schaffner* 152 (RB not seen).

Plants terrestrial, at 1000–1800 m elevation, in forests, from Vara Blanca (Pcia. Heredia), Cerro Tablazo, and around Boquete. Also from Mexico, Guatemala, and Nicaragua.

248. *Pteris podophylla* Swartz, J. Bot. (Schrader) 1800(2):67. 1801.

Lonchitis pedata L. Sp. Pl. ed. 2, 2:1536. 1763, non *Pteris pedata* L., 1753. TYPE: Jamaica, *Browne* (LINN 1249.1; isotype S not seen).

Litobrochia camptocarpa Fée, Gen. Fil. [Mém. Foug. 5]:137. 1852. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Moritz* 47 (P or RB not seen).

Litobrochia setifera Fée, Gen. Fil. [Mém. Foug. 5]:138. 1852. TYPE: Mt. S. Martín, Mexico, *Galeotti* 6571 (RB not seen).

Pteris trialata Sodiro, Anales Univ. Quito 8(55):76 (repr. 107). 1893. TYPE: Nieblí, Pcia. Pichincha, Ecuador, *Sodiro* (Hb. Sodiro not seen; isotypes P not seen, US).

Pteris ferruginea Bommer in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 191. 1896, nom. illeg. Published in synonymy.

Pteris pedata Kuhn in Schenck, Hedwigia 35:161. 1896, non L., 1753, nom. illeg. A renaming of *P. podophylla* Swartz, and so based on the type of that name.

Pteris podophylla var. *rufopubescens* Hieron. Hedwigia 48:244. 1909. TYPE: Between Bogotá and Muzo, Depto. Cundinamarca or Boyacá, Colombia, *Stuebel* 538 (B not seen).

Pteris inflexa Copel. Univ. Calif. Publ. Bot. 19:289, t. 41. 1941. TYPE: Barranca near Ojo de Agua, Orizaba, Edo. Veracruz, Mexico, 1200 m, *Copel. Mex. Ferns* 79 (MICH not seen; isotype UC).

TYPE: A renaming of *Lonchitis pedata* L., and so based on the type of that name.



245 *P. navarrensis*



243 *P. muricata*



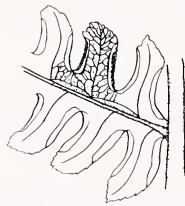
246 *P. obscura*



247 *P. paucinervata*



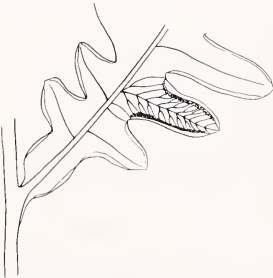
244 *P. muricella*



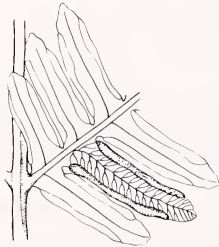
248 *P. podophylla*



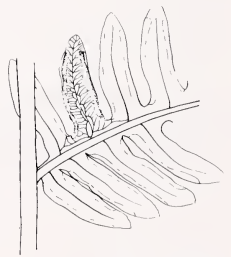
249 *P. polita*



251 *P. pungens*



250 *P. plumula*



252 *P. tripartita*

Plants terrestrial, at (400)1000–2500 m elevation, at forest edges and along trails in forests, from north of S. Ramón, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, near S. Vito de Java, and Curandó below Novita (Depto. Chocó). Also from Cuba, Jamaica, Hispaniola, Mexico, Guatemala, El Salvador, Nicaragua, and Venezuela to Bolivia.

Pteris costaricensis Rosenst. probably is a hybrid between this species and *P. altissima*. A presumable isotype (*Brade & Brade* 469, UC) has irregular spores, some of them abortive, and probably 16 or 32 per sporangium. The lamina is yellow-green as in *P. podophylla*, but the costal veins are biarcuate like those of *P. altissima*. Rosenstock (Repert. Sp. Nov. Fedde 22:7. 1925) cited 461 as the type number; either it or 469 could be in error.

249. *Pteris polita* Link, Hort. Reg. Bot. Berol. 2:30. 1833.

Pteris propinqua J. Agardh, Recens. Sp. Pterid. 65. 1839. LECTOTYPE: Jamaica, *Bancroft* (K not seen), chosen by Tryon (Contr. Gray Herb. 194:202. 1964).

Pteris propinqua var. *cumingiana* J. Agardh, Recens. Sp. Pterid. 65. 1839. TYPE: Panama, *Cuming 1182bis* (K not seen fragm US).

Pteris biformis Splitgb. Tijdschr. Natuurl. Gesch. Physiol. 7:422. 1840. TYPE: Merveille Plantation, Surinam, *Splitgerber* (L not seen photos 187–189).

Pteris hostmanniana Ettingsh. Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 23:55. 1864. TYPE LOCALITY: Surinam.

TYPE: Based on material from Brazil cultivated in the botanical garden at Berlin (authentic specimens B not seen photos 5449, 5450), according to Morton (Contr. U. S. Natl. Herb. 38:75. 1967).

Plants terrestrial, at 0–700 m elevation, in forests, from the Atlantic coastal plain of Costa Rica and western Panama, near Sta. Fé, the Canal Zone and adjacent Pcia. Panama, near Cana, and near La Teresita (Depto. Chocó). Also from Jamaica, Mexico to Nicaragua, Venezuela to Bolivia, Surinam, and Brazil.

250. *Pteris plumula* Desv. Mém. Soc. Linn. Paris 6:297. 1827.

Pteris pectinata Desv. Ges. Naturf. Freunde Berlin Mag. 5:324. 1811, non Cav., 1802, nom. illeg. TYPE: Antilles, *collector unknown* (P not seen), discussed by Weatherby (Contr. Gray Herb. 124:18. 1939).

Pteris swartziana J. Agardh, Recens. Sp. Pterid. 34. 1839, nom. illeg. TYPE: A renaming of *P. biaurita* sensu Swartz (Syn. Fil. 98. 1806), and so based on the basis of that name, which itself is superfluous because *P. quadriaurita* Retz. was cited in synonymy by Swartz.

Pteris repandula Link, Fil. Sp. 56. 1841. TYPE: A renaming of *P. biaurita* sensu Link (Hort. Reg. Bot. Berol. 2:28. 1833), and so based on the basis of that name.

Pteris nemoralis var. *major* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:53. 1842. TYPE: Zacuapan, Edo. Veracruz, Mexico, *Galeotti 6291* (BR not seen).

Pteris felosma J. Smith, Bot. Mag. (Curtis) 72, Comp.:24. 1846. TYPE: Cultivated at Kew, originally from Jamaica, *collector unknown* (K not seen; isotypes BM not seen, L not seen photo 2177).

FIGS. 243–252. *Pteris*. FIG. 243. Pinnule base of *P. muricata*, Maxon 314. FIG. 244. Pinnule base of *P. muricella*, Smith 48/141. FIG. 245. Pinna base of *P. navarrensis*, Lankester 711. FIG. 246. Pinna base of *P. obscura*, Goldman 1890. FIG. 247. Pinna base of *P. paucinerata*, Killip 5204. FIG. 248. Pinnule base of *P. podophylla*, Maxon 8083. FIG. 249. Basal portion of basal basisopic pinnule of basal pinna of *P. polita*, Stern 684. FIG. 250. Pinna base of *P. plumula*, Wilbur & Stone 9788. FIG. 251. Pinna base of *P. pungens*, Scamman & Holdridge 7916. FIG. 252. Pinna base of *P. tripartita*, Feddema 2076, Colombia.

Pteris quadriaurita var. *affluentior* Jenm. J. Bot. Brit. For. 19:53. 1881, as “*affluentius*.” TYPE: Jamaica, *Jenman 12* in 1879 (K not seen).

Pteris quadriaurita var. *curtidens* Christ in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 189. 1896. TYPE: S. Francisco de Guadalupe, Pcia. S. José, *Tonduz 8494* (BR not seen; isotype CR).

Pteris quadriaurita var. *asperula* Christ in Pitt. Prim. Fl. Costaric. 3(1):22. 1901. TYPE: Cañas Gordas, Pcia. Puntarenas, 1100 m, *Pittier 10963* (P or RB not seen; isotypes CR, US).

Pteris quadriaurita var. *strigulosa* Christ, Bull. Herb. Boissier II, 5:160. 1905, nom. illeg. Based on *P. quadriaurita* var. *asperula* Christ, non *P. asperula* J. Smith, 1841.

TYPE: A renaming of *P. pectinata* Desv., and so based on the type of that name.

Plants terrestrial, at 0–1900 m elevation, in forests, along trails and streams, from the Cordillera de Tilarán, the Cordillera Central, the Meseta Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, and Cerro Azul. Also from throughout most of tropical America, except for the Guianas.

The well known name *P. quadriaurita* Retz., which applies to sexual diploid material from Ceylon and southern India, probably should not be used for American material or for Old World material that is apogamous and triploid, judging by counts reported by Löve, Löve, and Pichi Sermolli (Cytotax. Atlas Pterid. 124. 1977).

251. *Pteris pungens* Willd. Sp. Pl. ed. 4, 5:387. 1810.

Pteris macroura Willd. Sp. Pl. ed. 4, 5:380. 1810. TYPE: Plate 13 of Plumier’s “*Traité...*”, which was based on a specimen collected by Plumier on Martinique or Hispaniola.

Pteris acuminata Desv. Ges. Naturf. Freunde Berlin Mag. 5:324. 1811. TYPE: Puerto Rico, collector unknown (P-Hb. Desv. not seen), examined by Proctor (pers. comm.).

Pteris longicauda Christ in Pitt. Prim. Fl. Costaric. 3(1):21. 1901. TYPE: Sto. Domingo de Golfo Dulce, Pcia. Puntarenas, *Tonduz 10011* [cited as *10071*] (P not seen; isotype US).

Pteris pungens var. *shimekii* Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:37, f. 3. 1912. TYPE: Trail from Fresno, near Mariquita, Depto. Tolima, Colombia, 800 m, *Mayor 101* (S not seen; isotype US).

LECTOTYPE: Plate 14 of Plumier’s “*Traité...*”, which was based on a specimen collected by Plumier along the Grande Rivière in the Leogane section of Hispaniola, chosen by Proctor (Fl. Less. Antill. 2:144. 1977).

Plants terrestrial, at 0–800(1100) m elevation, from throughout the Flora area. Also from Jamaica, Hispaniola, Puerto Rico, the Lesser Antilles, Trinidad, Mexico to Nicaragua, Venezuela to Bolivia, and Surinam.

252. *Pteris tripartita* Swartz, J. Bot. (Schrader) 1800(2):67. 1801.

TYPE: Java, *Thunberg* (UPS not seen), cited by Swartz (Syn. Fil. 100, 293. 1806).

Plants terrestrial, at 0–700(1100) m elevation, from Tapantí, near Limón (Pcia. Limón), the Peninsula de Osa, Cerro Jefe and Cerro Brewster (Pcia. Panama), and the Río Tamaná below Novita (Depto. Chocó). Also from Florida, Cuba, Jamaica, Puerto Rico, the Lesser Antilles, Nicaragua, Venezuela, and Colombia.

This species is naturalized from the Old World and is spreading rapidly in the New World tropics.

39. NEUROCALLIS Fée

Plants terrestrial; rhizomes stout, erect or short-ascending, woody, scaly at the apex, the scales small, linear-lanceate, sharply bicolorous, the margins slightly erose; fronds large, strongly dimorphic, the fertile ones exceeding the sterile ones;

stipes thick, sulcate, scaly and atropurpureous at the base, stramineous distally; laminae oblong, pinnate, firmly herbaceous, glabrous, the veins anastomosing without included veinlets in several series on each side of the costae, the size of the areolae diminishing toward the frond margin; sterile pinnae elliptic-oblong, acute at the base, acuminate at the apex; fertile pinnae linear, bearing sporangia in a wide, submarginal band scarcely protected by the sterile, revolute pinna margin; sporangia long-stalked, the capsules deciduous, the stalks appearing among the sporangia like paraphyses.

Antilles, Costa Rica, and Venezuela; monotypic.

253. *Neurocallis praestantissima* var. *subcaudata* Gómez, *Revista Biol. Trop.* 20:183. 1972.

Pteris macrodictya Christ, *Bull. Herb. Boissier* II, 7:267. 1907. TYPE: Costa Rica, *Wercklé* in 1904 (P not seen).

TYPE: Patillo, Pcia. Cartago, *Gómez & Kennedy* 3345 (CR not seen).

Plants terrestrial, at 900–2400 m elevation, in wet forests, from Patillo, Tapantí, near Pejivalle (Pcia. Cartago), and the Cerro de las Caricias and near Vara Blanca (both Pcia. Heredia).

The typical variety from the Antilles and Venezuela differs in having the sterile pinnae sessile or nearly so.

40. ACROSTICHUM L.

Plants terrestrial in marshes and usually mangrove swamps; rhizomes stout, short-creeping or erect, bearing copious, spongy roots, scaly at the apex, the scales lanceolate, slightly bicolorous, the margins entire to erose; fronds large, caespitose, slightly dimorphic, the fertile pinnae distal or on separate fronds from the sterile pinnae; stipes thick, sulcate, stramineous to brownish, scaly at the very base; laminae oblong, pinnate, chartaceous to coriaceous, glabrous or thinly pilose on the abaxial surface; veins anastomosing in many series of about uniform size, without included veinlets; sporangia long-stalked, borne over the abaxial surface of the pinnae, not organized into sori; paraphyses present.

Pantropical, mostly in swamps; 3 species.

ADAMS, D. C. and P. B. TOMLINSON. 1979. *Acrostichum* in Florida. *Amer. Fern J.* 69:42–46.

1. Veins of sterile pinnae immersed abaxially, glabrous; fertile fronds spreading like the sterile ones, with only 1–4 apical pinna pairs fertile; pinnae 10–14 pairs, distant, coriaceous; paraphyses among the sporangia minute, capitate-stellate. Fronds 1.5–3 m long; laminae oblong, 1–2 m long, 20–40 cm wide; pinnae elliptic-spathulate, 15–30 cm long, 3–6 cm wide.

254. *A. aureum*

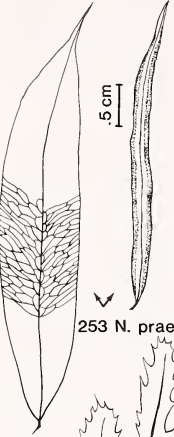
1. Veins of sterile pinnae prominent abaxially, usually thinly pilose; fertile fronds strictly erect and taller than the spreading sterile ones, with all the pinnae fertile; pinnae ca. 15 or more pairs, imbricate or nearly so, chartaceous; paraphyses among the sporangia with a large, sausage-shaped terminal cell. Fronds 1.5–3.5 m long; laminae oblong, 1–2.5 m long, 25–60 cm wide; pinnae narrowly lanceolate to spathulate, 15–40 cm long, 3–5 cm wide.

255. *A. danaeifolium*

254. *Acrostichum aureum* L. Sp. Pl. 2:1069. 1753.

Acrostichum marginatum Schkuhr, *Vier Zwanzigste Kl. Linn. Pfl.-Syst.* 2:185, t. 3b. 1805, non L., 1753, nom. illeg. TYPE: Essequibo River, Guyana, *Meyer* (HAL not seen).

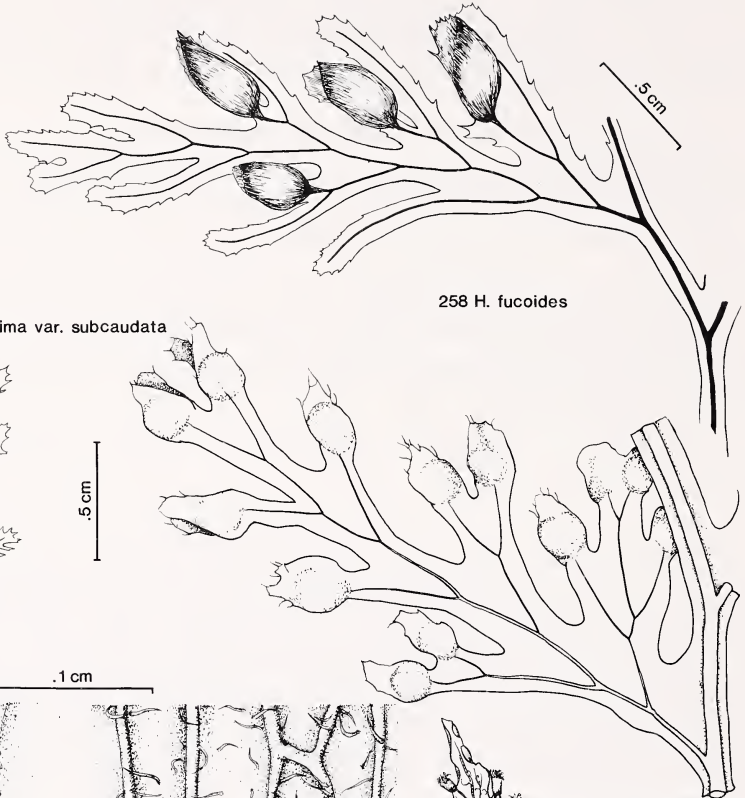
Acrostichum formosum K. Presl, *Delic. Prag.* 1:160. 1822. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Langsdorff* (LE or PRC not seen).



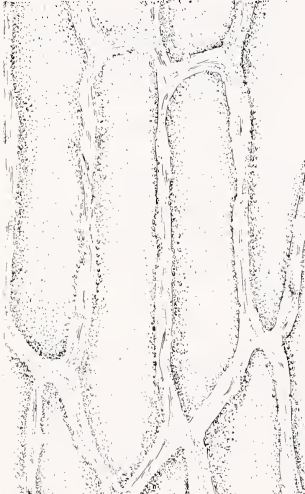
253 *N. praestantissima* var. *subcaudata*



257 *H. tunbrigense*



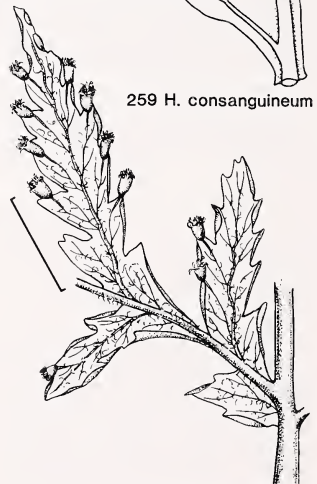
258 *H. fucoides*



254 *A. aureum*



255 *A. danaeifolium*



259 *H. consanguineum*

256 *L. costaricensis*

Acrostichum juglandifolium Kaulf. Enum. Fil. 65. 1824. TYPE: A renaming of *A. marginatum* Schkuhr, and so based on the type of that name.

Chrysodium vulgare Fée, Hist. Acrostich. [Mém. Foug. 2]:97. 1845, nom. superfl. TYPE: A renaming of *A. aureum* L., and so based on the type of that name.

Chrysodium cayennense Fée, Hist. Acrostich. [Mém. Foug. 2]:100, t. 59. 1845. TYPE: French Guiana, *LePrieur* 1837 (P-Hb. Bory not seen).

Chrysodium sculpturatum Fée, Hist. Acrostich. [Mém. Foug. 2]:100, t. 61. 1845. SYNTYPES: Near Lazareto, Panama, *Bonpland* (RB not seen); and New Ireland, *Richard* (P-Hb. Bory not seen).

LECTOTYPE: Plate 7 of Plumier's "Description...", which is based on a specimen collected by Plumier at Ft. Royal, Martinique, chosen by Lellinger (Proc. Biol. Soc. Wash. 98:366. 1985).

Plants terrestrial, at 0–100(300) m elevation, in swamps, from the Atlantic and Pacific coasts and coastal plains of Costa Rica and Panama, the Canal Zone, and the Río Baudó. Also from Florida, the Antilles, Mexico to Nicaragua, Trinidad, Venezuela, Colombia, Ecuador, the Guianas, and Brazil.

See *A. danaeifolium* for a discussion of hybrids with that species.

255. *Acrostichum danaeifolium* Langsd. & Fisch. Pl. Voy. Russes Monde 1:5, t. 1. 1810.

Chrysodium hirsutum Fée, Hist. Acrostich. [Mém. Foug. 2]:99, t. 62, f. 2. 1845. SYNTYPES: Brazil, *Pohl* (MA? not seen), *Martius* 365 (MA not seen); Guyana, *LePrieur* (P or RB not seen); Guadeloupe, *L'Herminier* (P or RB not seen); Hispaniola, *Ritter* (P or RB not seen); Guatemala, *Friedrichsthal* 231 (W not seen); and South Africa, *Schott* (W not seen).

Chrysodium lomarioides Jenm. Timheri 4:314. 1885, non *Acrostichum lomarioides* Bory, 1833. TYPE: Guyana, *Jenman* (NY? not seen).

Acrostichum excelsum Maxon, Proc. Biol. Soc. Wash. 18:224. 1905. TYPE: A renaming of *Chrysodium lomarioides* Jenm., and so based on the type of that name.

Chrysodium lomarioides var. *hastatum* Christ, Bull. Herb. Boissier II, 5:725. 1905. TYPE: Near El Carmen, Edo. Chiapas, Mexico, *Muench* (P not seen; isotypes DS not seen, US).

Acrostichum excelsum f. *lobatum* A. A. Eaton, Bull. Torrey Bot. Club 33:464. 1906. TYPE: Florida, A. A. Eaton (GH? not seen).

Acrostichum danaeifolium f. *incanum* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]: 111. 1929. TYPE LOCALITY: Florida.

TYPE: Ilha Sta. Catarina, Est. Sta. Catarina, Brazil, *Langsdorff* (LE not seen Nicolson photo).

Plants terrestrial, at 0–200 and 1100–1200 m elevation, in coastal swamps and rarely upland marshes, from the Atlantic coast of Costa Rica and Panama, near Desamparados (Pcia. S. José), and Barro Colorado Island and the vicinity of Juan Mina, Chagres River (Canal Zone). Also from tropical America except Peru.

R. L. Petersen (pers. comm.) has found a hybrid between this species and *A. aureum* in lowland Panama. The fertile fronds and paraphyses are intermediate between the parents, and the spores are abortive.

FIGS. 253–259. *Neurocallis*, *Acrostichum*, *Loxsomopsis*, and *Hymenophyllum*. FIG. 253. Sterile and fertile pinnae of *N. praestantissima* var. *subcaudata*, Skutch 3753 and Standley & Valerio 46929. FIG. 254. Abaxial surface of the sterile lamina of *A. aureum*, Mickel 2761. FIG. 255. Abaxial surface of the sterile lamina of *A. danaeifolium*, Bartlett & Lasser 16318. FIG. 256. Basal portion of suprabasal pinnule of *L. costaricensis*, Mickel 3001. FIG. 257. Median pinna of *H. tunbrigense*, Stork 1290. FIG. 258. Median pinna of *H. fucoides*, Maxon 5447. FIG. 259. Median pinna of *H. consanguineum*, Standley & Valerio 50300.

LOXSOMACEAE

Monotypic; see description of *Loxsomopsis*.

41. LOXSOMOPSIS Christ

Plants terrestrial; rhizomes long-creeping, branched, bearing a few fibrous roots and numerous dark brown bristles; fronds mostly large, scattered along the rhizomes; stipes brown, sparsely bristly at and near the base, slightly sulcate; laminae lanceolate to oblong, 2-pinnate-pinnatisect, herbaceous, provided with catenate hairs on the axes and especially the abaxial lamina surface; veins free, forked, reaching the margin, the sterile vein tips slightly swollen; pinnae asymmetrical, gradually reduced toward the basiscopic base, the basiscopic basal pinnules reduced nearly to auricles; sporangia borne at the apex of an elongate, marginal receptacle, protected by an urn-shaped, entire indusium; paraphyses present.

Tropical America, but very rare; 3 species.

256. *Loxsomopsis costaricensis* Christ, Bull. Herb. Boissier II, 4:399. 1904.

TYPE: Costa Rica, *Wercklé & Brune* 279 (P not seen).

Plants terrestrial, at 1900–2600 m elevation, in wet, open forests and scrub forests, from the Cordillera Central, near Tapantí, and the Cordillera de Talamanca along the Interamerican Highway south of El Empalme (Pcia. S. José).

According to F. S. Wagner (Amer. J. Bot. 67:737. 1980), this species has 46 pairs of chromosomes, which is a dennstaedtioid number.

HYMENOPHYLLACEAE

Rhizomes very thin and long-creeping or short and erect to ascending, hairy, the hairs multicellular, often bristle-like; fronds minute to medium-sized, rarely hemiepiphytic and indefinitely long; stipes wiry or thin, often alate at least distally, obsolete in a few species; laminae simple to several times pinnate, usually 1 cell thick between the veins, rarely nearly skeletonized, simple to several times pinnate, glabrous or minutely hairy, the hairs simple, forked, stellate, or more complex; veins free or anastomosing without included veinlets, sometimes with false veins parallel or perpendicular to the true veins; sori marginal, terminal on ultimate segments or along the entire to lobed lamina margin; indusia (involucre) bilabiate or tubular; sporangia relatively few per sorus, subspherical, the annulus transverse to slightly oblique; paraphyses none.

1. Involucre bilabiate, circular, semicircular, or angled or conical at the base; sporangia-bearing receptacles low or short, rarely protruding from the involucre.

42. *Hymenophyllum*

1. Involucre long-conical to tubular, truncate at the apex or with short involucre lips; sporangia-bearing receptacles long, setiform, commonly protruding from the involucre in age.

43. *Trichomanes*

42. HYMENOPHYLLUM J. E. Smith

Plants epiphytic or occasionally epipetric; rhizomes long-creeping, almost thread-like, hairy, the hairs multicellular, brown or reddish; fronds small to minute; stipes filiform, sometimes partially alate, scattered along the rhizomes, glabrous or hairy, the hairs simple or variously stellate; laminae simple to decompound, ovate to oblong, for the most part only 1 cell thick, the rachis commonly partially or entirely alate, glabrous or the lamina surface and/or margins hairy, the hairs simple, forked, or variously stellate, the sterile ultimate segments with a single vein not reaching the margin; sporangia borne on usually low marginal receptacles, protected by an involucre formed of two usually nearly round or ovate flaps of tissue; sporangia long-stalked.

Mostly pantropical in perpetually moist localities at middle elevations; ca. 310 species.

LELLINGER, D. B. 1984. Hymenophyllaceae (Filicales) in B. Maguire and collaborators. The botany of the Guayana Highland - Part XII. Mem. New York Bot. Gard. 38:9-46.

MORTON, C. V. 1947. The American species of *Hymenophyllum* section *Sphaerocionium*. Contr. U. S. Natl. Herb. 29:139-199.

MORTON, C. V. 1968. The genera, subgenera, and sections of the Hymenophyllaceae. Contr. U. S. Natl. Herb. 38:153-214.

1. Segment margins entire or, if rarely slightly denticulate, the teeth tipped by 1-celled or stellate hairs; involucre usually round or obtuse, rarely conical at the base..3.

1. Segment margins toothed, the teeth not tipped by hairs; involucre often rather conical at the base (subg. *Hymenophyllum*)..2.

2(1). Involucre ovate to obovate, not more than 2 times longer than wide; only 1(2) adaxial acroscopic pinna segments fertile; rachises glabrous; laminae (1)1.5-2 cm wide.

258. *H. tunbrigense*

2(1). Involucre ovate to linear, 2-5 times longer than wide; (1)2-5 adaxial acroscopic pinna segments fertile; rachises usually sparsely pilose; laminae 2-4(6) cm wide.

257. *H. fucoides*

3(1). Laminae glabrous (subg. *Mecodium*)..23.

3(1). Laminae hairy on the lamina tissue and/or the veins on the abaxial surface (subg. *Leptocionium*)..4.

4(3). Hairs absent on the lamina surfaces, borne only on the veins and margins of the laminae..11.

4(3). Hairs present on the lamina surfaces, as well as on the veins and margins..5.

5(4). Stipes 0.15–0.25 mm in diam.; fronds mostly less than 15 cm long, determinate or subdeterminate..8.

5(4). Stipes (0.25)0.4–0.6 mm in diam.; fronds mostly more than 15 cm long, indeterminate..6.

6(5). Rachises not alate; laminae densely covered with stellate hairs, the surface obscure. Laminae grayish adaxially, cinnamomeous abaxially; pinnae up to 4 cm long, 1 cm wide, the fronds tapered toward the base.

271. *H. plumosum*

6(5). Rachises alate; laminae sparsely covered with stellate hairs, the surface visible..7.

7(6). Proximal pinnae equilateral at the base, acuminate at the apex; brownish, stellate, commonly 4-armed hairs few between the veins; veins of the laminae not alate.

275. *H. sieberi*

7(6). Proximal pinnae inequilateral at the base, excavate at the basiscopic base, obtuse at the apex; cinnamomeous, stellate, mostly 5–7-armed hairs many between the veins; veins of the laminae sometimes slightly alate on the abaxial surface.

266. *H. horizontale*

8(5). Pinnae all simple, undivided. Stipes 1–3 cm long; laminae ca. 2 times longer than the stipes; rachises alate throughout; ultimate segments 1–1.75 mm wide.

267. *H. lanatum*

8(5). Pinnae, or most of them, pinnatifid or more divided..9.

9(8). Rachises alate throughout; laminae 4–8 times longer than the stipes, narrowly lanceate, usually widest at the base; stipes 0.5–1.5 cm long. Ultimate segments 1.25–1.75 mm wide.

263. *H. fragile*

9(8). Rachises partially exalate; laminae 1–2(4) times longer than the stipes, ovate to ovate-lanceolate, usually widest distal to the base; stipes 1–4 cm long..10.

10(9). Stipe hairs stellate; basal basiscopic pinnules usually simple; ultimate segments 0.8–1 mm wide; lowest pinnae petiolulate.

264. *H. hemipteron*

10(9). Stipe hairs simple (1–3-celled) or a few forked with 1- or 2-celled, elongate rays; basal basiscopic pinnules 1(2)-forked; ultimate segments 1–1.5(2.25) mm wide; basal pinnae sessile or rarely petiolulate.

262. *H. elegantulum*

11(4). Stipes (exclusive of any ala) usually less than 0.3 mm in diam., usually less than 5 cm long..14.

11(4). Stipes (exclusive of any ala) 0.3 mm in diam. or more, usually more than 5 cm long; hairs on the lamina margins simple or forked at the base..12.

12(11). Rachises not entirely alate. Stipes (3)5–10 cm long; laminae ovate-lanceolate, 6–18 cm long, 2.5–9 cm wide; lumina of marginal cells rather large and clear.

276. *H. subrigidum*

12(11). Rachises alate throughout..13.

13(12). Stipes alate at the apex; rhizomes 0.3–0.5 mm in diam. Stipes 3–9 cm long; laminae ovate to ovate-lanceolate, rarely linear, 7.5–20 cm long, (2)4–10 cm wide.

269. *H. microcarpum*

13(12). Stipes not alate at the apex; rhizomes 0.7–1 mm in diam. Stipes 5–10 cm long; laminae ovate to ovate-lanceolate, 8–15 cm long, 6–10 cm wide.

259. *H. consanguineum*

14(11). Rachises partially exalate..19.

14(11). Rachises entirely alate..15.

15(14). Marginal hairs mostly simple or forked at the base..17.

15(14). Marginal hairs mostly stellate..16.

16(15). Laminae less than 10 cm long; pinna lobes 2–4 mm long; stellate marginal lamina hairs definitely stalked. Stipes 0.75–3 cm long, broadly alate toward the apex; laminae linear-lanceolate to lanceolate, 0.8–2.5 cm wide, the broad rachis ala often rather crisped, the stellate hairs abundant.

265. *H. hirsutum*

16(15). Laminae 13–23 cm long; pinna lobes less than 2 mm long; stellate marginal lamina hairs subsessile. Stipes less than 1 cm long, broadly alate toward the apex; laminae linear to linear-lanceolate, 1.5–2.5 cm wide, the broad rachis ala plane, the stellate hairs few.

270. *H. mortonianum*

17(15). Laminae (especially the stipe ala) slightly crisped. Stipes 1–2.5 cm long; laminae lanceolate, 7–15 cm long, 1–2(4) cm wide; lumina of lamina cells large and clear.

260. *H. crispum*

17(15). Laminae plane..18.

18(17). Ultimate segments ca. 0.6–1.25 mm wide; rachis ala not uniform, 0–0.25 mm wide. Stipes 1–3.5 cm long; laminae lanceolate, 2.5–6.5 cm long, 1–2.5 cm wide.

274. *H. semiglabrum*

18(17). Ultimate segments 1–2 mm wide; rachis ala uniformly ca. 0.5 mm wide. Stipes up to 1 cm long; laminae linear (in juveniles) to ovate, up to 3 cm long, 2 cm wide.

273. *H. saenzianum*

19(14). Pinnae, at least the proximal ones, petiolulate..21.

19(14). Pinnae sessile or adnate..20.

20(19). Marginal hairs stellate. Stipes 0.2–2(3) cm long; laminae narrowly lanceolate to oblong, 2.5–7.5(11) cm long, 0.5–2(3) cm wide.

261. *H. elegans*

20(19). Marginal hairs mostly simple. Stipes 1–3.5 cm long; laminae lanceate, 2.5–6.5 cm long, 1–2.5 cm wide.

274. *H. semiglabrum*

21(19). Marginal hairs simple or forked at the base; veins glabrous; fronds ovate or oblong, determinate. Stipes 1–3 cm long; laminae 4–9 cm long, 1.5–4 cm wide.

268. *H. lineare*

21(19). Marginal hairs stellate; veins with stellate hairs; fronds linear, indeterminate..22.

22(21). Stipe hairs mostly stellate; pinnae with 5–7 pairs of segments; costae completely alate.

272. *H. pulchellum*

22(21). Stipe hairs mostly simple; pinnae with 1–3 pairs of segments, or some of these overgrown and frond-like; costae partially exalate.

277. *H. trichophyllum*

23(3). Laminae 2-pinnate or more divided..26.

23(3). Laminae pinnate-pinnatifid or less divided..24.

24(23). Laminae suborbicular, obtuse to truncate at the base, almost ternately divided with only the basal lobes themselves lobed. Fronds less than 2.5 cm long; stipes 0.2–0.8 cm long; ultimate segments 1–2 mm wide.

279. *H. brevifrons*

24(23). Laminae triangular to lanceolate, acute to obtuse at the base, not ternately divided, with several pairs of lobes themselves lobed..25.

25(24). Ultimate segments 2–2.5 mm wide; involucre ovate, obtuse at the base, round at the apex; fronds 3–12(20) cm long.

278. *H. asplenioides*

25(24). Ultimate segments ca. 1.5 mm wide; involucre nearly trapezoidal, acute at the base and apex; fronds 2–4 cm long.

277a. *H. apiculatum*

26(23). Laminae usually plane (except the segments often folded in *H. nigrescens*), truncate at the base, ovate or lanceolate, widest near the base, often erect; rachises 1–4 times longer than the stipes..29.

26(23). Laminae undulate or crisped (except in some *H. myriocarpum*), gradually attenuate toward the base, narrowly elliptical or linear, widest near the middle, often pendent; rachises (2)3–7 times longer than the stipes..27.

27(26). Ala uniform along the rachis between the pinnae; laminae plane or somewhat undulate. Stipes alate to the base; ultimate segments constricted proximal to the involucre.

283. *H. myriocarpum*

27(26). Ala narrower distally between the pinnae; laminae undulate to crisped..28.

28(27). Laminae undulate, not strongly crisped, 5–30 cm long; lateral branches occasionally overgrown and frond-like; ultimate segments constricted proximal to the involucre; involucre not undulate, entire at the apex.

287. *H. undulatum* & a + 10V

28(27). Laminae strongly crisped, up to 7(10) cm long; lateral branches not overgrown and frond-like; ultimate segments not constricted proximal to the involucre; involucre undulate, irregular at the apex.

280. *H. contortum*

29(26). Stipes not at all alate. Stipes 1–8 cm long; laminae ovate to linear-lanceolate, 3.5–23 cm long, 1.5–9 cm wide; pinnae occasionally overgrown and somewhat frond-like.

281. *H. costaricanum*

29(26). Stipes alate at least at the apex and often to the base..30.

30(29). Involucre acute at the base; rachises usually with an ala ca. 0.1 mm wide..32.

30(29). Involucre obtuse to truncate at the base; rachises usually with an ala 0.25–0.5 mm wide..31.

31(30). Segments and alae usually plane, sometimes the segments slightly folded when dry; pinnae often not imbricate; involucre orbicular. Stipes (1.5)4–8 cm long; laminae 3-pinnate-pinnatifid to 4-pinnate, often ovate.

285. *H. polyanthos*

31(30). Segments and alae folded; pinnae usually imbricate; involucre wider than long. Stipes 1–5(6) cm long; laminae 2–3-pinnate, often linear-lanceolate.

284. *H. nigrescens*

32(30). Fronds up to 12(23) cm long, 3–4-pinnate; involucre acute at the apex.

286. *H. siliquosum*

32(30). Fronds mostly 15–25 cm long, 3–5-pinnate; involucre obtuse to round at the apex.

282. *H. farallonense*

HYMENOPHYLLUM subg. HYMENOPHYLLUM

257. *Hymenophyllum fucoides* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):99. 1801.

Trichomanes fucoides Swartz, Nov. Gen. Sp. Pl. Prodr. 136. 1788. TYPE: Jamaica, Swartz (S not seen photo 6174; isotypes B-Hb. Willd. 20227-1 not seen Tryon photo, BM not seen photo 6590).

Hymenophyllum spinulosum H.B.K. Nov. Gen. Sp. 1:26 (fol. 21). 1816. TYPE: Mt. Avila, between La Guaira and Caracas, Distr. Fed., Venezuela, 750 hexap elev., *Humboldt & Bonpland* (P not seen microfiche S. I. Library).

Hymenophyllum peruvianum Hook. & Grev. Icon. Fil. 2:t. 208. 1831. TYPE: Esmeraldas, Ecuador, 5000 ft, Jameson (K not seen).

Hymenophyllum blepharodes K. Presl, Hymenophyllaceae 51 (postpr. 143). 1843. TYPE: Martinique, Kohaut (PRC not seen).

Hymenophyllum fucoides var. *frigidum* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:291 (repr. 139). 1849, as "*frigida*." TYPE: Cerro de Zempoaltepec, Edo. Oaxaca, Mexico, 8000–9000 ft, Liebmann (C not seen).

Hymenophyllum pedicellatum Kunze ex Klotzsch, Linnaea 20:439. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, Moritz 346 (B not seen; isotypes BR not seen photo 4834, US). *Leptocionium fucoides* sensu Klotzsch (Linnaea 18:533. 1844) is cited in synonymy.

Hymenophyllum podocarpum Fée, Crypt. Vasc. Brésil 1:196, t. 71, f. 3. 1869. TYPE: Organ Mountains, Est. Rio de Janeiro, Brazil, Glaziou 3350 (P not seen photos 4579, 4580).

Hymenophyllum fucoides var. *integrum* Kuhn ex Christ in Pitt. Prim. Fl. Costaric. 3(1):3. 1901. TYPE: Guatemala, Bernoulli 340 (P not seen).

Plants epiphytic or rarely epipetric, at 400–3000 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito de Java, Cerro Jefe, Cerro Campana (Pcia. Panama), and Cerro Pirre above Cana. Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles, Mexico to Nicaragua, Trinidad and Venezuela to Bolivia and Brazil.

Plants with the longest teeth on the valves and lamina margin have been segregated as *H. ectocarpum* Fée, a species only dubiously distinct from *H. fucoides*.

258. *Hymenophyllum tunbrigense* (L.) J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:418. 1793.

Trichomanes tunbrigense L. Sp. Pl. 2:1098. 1753. TYPE: Uncertain; not Britain, collector unknown (LINN 1253.5 not seen microfiche S. I. Library), which according to Proctor (Ferns Jam. 5. 1985) was not in LINN until after 1755.

Plants epiphytic, at 1500–3800 m elevation, in forests and scrub forests, from the Cordillera Central and the Cordillera de Talamanca to Cerro Chirripó. Also from the southeastern United States, Jamaica, Hispaniola, Mexico, Guatemala, El Salvador, Venezuela, Colombia, Ecuador, Bolivia, Argentina, and Chile.

HYMENOPHYLLUM subg. LEPTOCIONIUM (K. Presl) Christ

259. *Hymenophyllum consanguineum* Morton, Contr. U. S. Natl. Herb. 29:163. 1947.

TYPE: Holcomb's Trail above Boquete, 1450–1650 m, Maxon 5624 (US; isotype NY).

Plants epiphytic on tree trunks, at 1200–2400 m elevation, in forests, from Monteverde, the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, Cerro Tute (Pcia. Veraguas), and above Cana. Also from Venezuela.

260. *Hymenophyllum crispum* H.B.K. Nov. Gen. Sp. 1:26 (fol. 22). 1816.

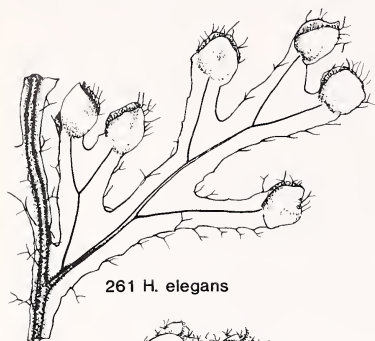
Sphaerocionium schiedeanum K. Presl, Hymenophyllaceae 60 (postpr. 152). 1843. TYPE: Mexico, Schiede (PRC not seen).

Sphaerocionium crispum var. *pilosum* Klotzsch, Linnaea 18:537. 1845, nom. superfl. TYPE: A renaming of *Hymenophyllum crispum* H.B.K., and so based on the type of that name.

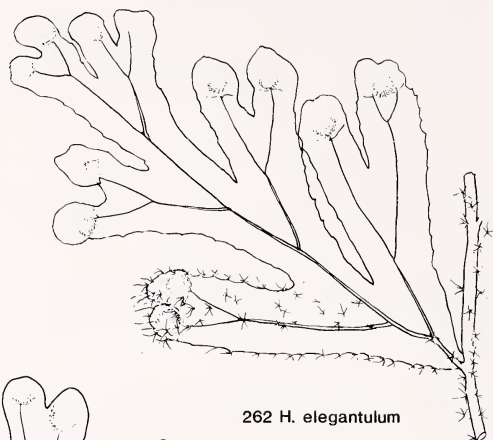
?*Hymenophyllum ciliatum* var. *nudipes* Kunze, Linnaea 18:351. 1845. TYPE: Mexico, Leibold 72 p. p. (LZ destroyed). This mixed collection may be partially referable to *H. hirsutum*.

?*Hymenophyllum divaricatum* v. d. Bosch, Nederl. Kruid. Arch. 5(3):190. 1863. TYPE: Venezuela, Moritz (B not seen).

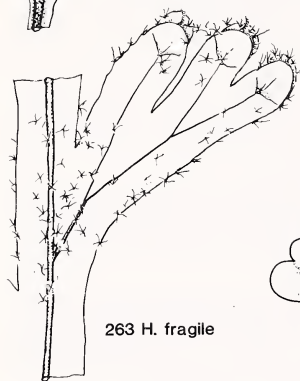
Hymenophyllum orbignianum v. d. Bosch, Nederl. Kruid. Arch. 5(3):191. 1863. TYPE: Yuracare, Bolivia, D'Orbigny 304 (P? not seen).



261 *H. elegans*



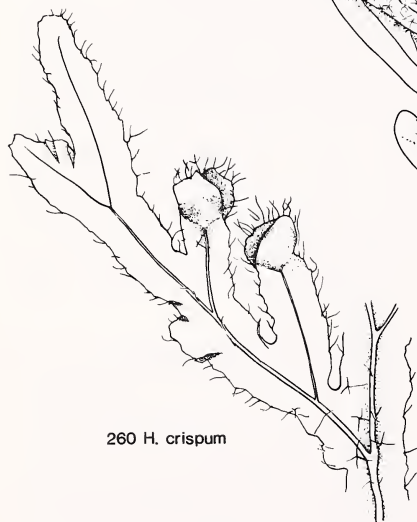
262 *H. elegantulum*



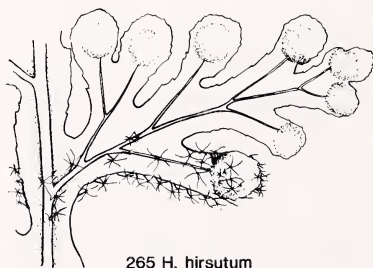
263 *H. fragile*



264 *H. hemipteron*



260 *H. crispum*



265 *H. hirsutum*

Hymenophyllum crispum var. *brasilianum* Fée, Crypt. Vasc. Brésil 1:195, t. 71, f. 2. 1869, as "*brasiliana*." TYPE: Serra dos Orgãos, Est. Rio de Janeiro, Brazil, *Glaziou* 3347 (P not seen photo 4566).

Hymenophyllum constrictum Christ, Bull. Herb. Boissier II, 4:939. 1904. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen; isotype US).

Hymenophyllum nitens Wercklé ex Christ, Bull. Herb. Boissier II, 4:940. 1904, non R. Br., 1810. SYNTYPES: Costa Rica, *Wercklé* 249 (P not seen photo 17045) and 252 (P not seen); and Serra Itatiaia, Brazil, 2100 m, *Dusén* 161 (P not seen photo 17047).

TYPE: Silla de Caracas, Distr. Fed., Venezuela, 990 hexap elev., *Humboldt & Bonpland* (P not seen photo 4567).

Plants epiphytic, at 1500–2000 m elevation, in forests, from the Cordillera Central. Also from Jamaica, Mexico, Guatemala, Venezuela, Colombia, Peru, Bolivia, and Brazil.

261. *Hymenophyllum elegans* Spreng. Syst. Veg. ed. 16, 4:133. 1827.

Hymenophyllum cruegeri K. Muell. Bot. Zeitung (Berlin) 12:722. 1854. TYPE: Mt. Tocuche, Trinidad, *Purdie & Crueger* (B not seen fragm US).

Hymenophyllum delicatissimum Fée, Crypt. Vasc. Brésil 2:86, t. 105, f. 1. 1873. TYPE: Serra dos Orgãos, Est. Rio de Janeiro, Brazil, *Glaziou* 3591 (P not seen photo 4595; isotype US).

Hymenophyllum caudatellum Christ, Bull. Herb. Boissier II, 4:939. 1904. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen; isotype US fragm NY).

Hymenophyllum elegans f. *minor* Morton, Contr. U. S. Natl. Herb. 29:154. 1947. TYPE: Sierra del Líbano, Sta. Marta mountains, Depto. Magdalena, Colombia, 1650 m, *H. H. Smith* 1100 (NY).

TYPE: Brazil, *Sellow* (LZ destroyed).

Plants epiphytic, at 1000–2800 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Cuba, Hispaniola, the Lesser Antilles, Guatemala, Trinidad, Venezuela, Colombia to Bolivia, and Brazil.

262. *Hymenophyllum elegantulum* v. d. Bosch, Nederl. Kruid. Arch. 4:408. 1858.

Hymenophyllum buchtienii Rosenst. Repert. Spec. Nov. Regni Veg. 5:229. 1908. TYPE: Unduavi, North Yungas, Depto. La Paz, Bolivia, *Buchtien* 897 (S not seen; isotype US).

Hymenophyllum elegantulum var. *petiolulatum* Morton, Contr. U. S. Natl. Herb. 29:171. 1947. TYPE: Jayuya, Puerto Rico, 1200 m, *Sargent* 3144 (US).

TYPE: Plate 33A of Hooker's "Species Filicum," which was based on a specimen collected at Pillzhum, Pcia. Cañar, Ecuador (*Jameson*, K not seen; isotype NY).

Plants epiphytic, at 1500–3300 m elevation, in forests, from the Cordillera Central, Cerro Chirripó, and Cerro Horqueta (Pcia. Chiriquí). Also from Cuba, Hispaniola, Puerto Rico, Mexico, Guatemala, Honduras, El Salvador, and Venezuela to Bolivia.

This species has rather variable fronds 6–30 cm long; often the larger specimens have petiolulate proximal pinnae. In my opinion such specimens should not be recognized taxonomically.

FIGS. 260–265. *Hymenophyllum*. FIG. 260. Median pinna of *H. crispum*, Hinton 14306a, Mexico. FIG. 261. Median pinna of *H. elegans*, Killip 5340. FIG. 262. Median pinna of *H. elegantulum*, Torres R. 6. FIG. 263. Pinna of *H. fragile*, Skutch 3559. FIG. 264. Frond of *H. hemipteron*, Maxon 8464. FIG. 265. Median pinna of *H. hirsutum*, Lellinger 827.

263. *Hymenophyllum fragile* (Hedw.) Morton, Contr. U. S. Natl. Herb. 29:172. 1947.

Trichomanes fragile Hedw. Fil. Gen. Sp. t. 18. 1802. TYPE: Not stated; Hedwig's original herbarium is at G. Plate 18 is labelled *fragile*, but the accompanying, unpagged text is headed *rigidum*, which must be taken as *T. rigidum* sensu Hedw., non Swartz, 1788.

Trichomanes hispidum Poir. Encyc. Méth. 8:71. 1808. TYPE: A renaming of *T. rigidum* sensu Hedw., and so based on the type of *T. fragile*.

Hymenophyllum intercalatum Christ, Bull. Herb. Boissier II, 4:942. 1904. TYPE: Turrialba, Pcia. Cartago, Pittier 13259ter (P not seen; isotype CR not seen).

Plants epiphytic, at (700)900–2300(3300) m elevation, in forests, from the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, near the Escuela Agrícola Alta Piedra, Sta. Fé, near Cana, and the upper slopes of Alto del Buey. Also from Cuba, Jamaica, Hispaniola, Mexico, Guatemala, Venezuela to Bolivia, and Brazil.

264. *Hymenophyllum hemipteron* Rosenst. Repert. Spec. Nov. Regni Veg. 22:4. 1925.

Hymenophyllum hemipteron f. *acropteron* Rosenst. Repert. Spec. Nov. Regni Veg. 22:5. 1925, as “*acroptera*.” TYPE: La Palma, Pcia. S. José, *Brade & Brade* 851 (S not seen fragm US).

Hymenophyllum hemipteron f. *minor* Rosenst. Repert. Spec. Nov. Regni Veg. 22:5. 1925. TYPE: Cisma, near S. Gerónimo, Pcia. Alajuela, 2100 m, *Brade & Brade* 620 (S not seen fragm US; isotype NY).

Hymenophyllum palmense Rosenst. Repert. Spec. Nov. Regni Veg. 22:5. 1925. TYPE: La Palma, Pcia. S. José, 1400 m, *Brade & Brade* 600 (S not seen; isotype UC).

LECTOTYPE: Cerro Tablazo, Pcia. S. José, *Brade & Brade* 621 (S not seen fragm US), chosen by Morton (Contr. U. S. Natl. Herb. 29:169. 1947).

Plants epiphytic on trunks, at 1000–2500(2800) m elevation, in forests, from the Cordillera Central, Cerro Tablazo, and the Cordillera de Talamanca to Pcia. Chiriquí.

The ultimate segments of this species are longer in relation to their width than are those of *H. elegantulum*, and the plants are smaller.

265. *Hymenophyllum hirsutum* (L.) Swartz, J. Bot. (Schrader) 1800(2):99. 1801, var. *hirsutum*.

Trichomanes hirsutum L. Sp. Pl. 2:1098. 1753. TYPE: Plate 50B of Plumier's “*Traité...*”, which is based on a specimen collected by Plumier in the West Indies.

Trichomanes ciliatum Swartz, Nov. Gen. Sp. Pl. Prodr. 136. 1788. TYPE: Jamaica, *Swartz* (S not seen; isotypes B-Hb. Willd. 20222 not seen Tryon photo, BM not seen photo 6587, US).

Sphaerocionium vestitum K. Presl, Hymenophyllaceae 58 (postpr. 150). 1843. LECTOTYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Beyrich* (PRC? not seen), inferentially chosen by Morton (Contr. U. S. Natl. Herb. 29:115. 1947).

Sphaerocionium grevilleanum K. Presl, Hymenophyllaceae 34 (postpr. 126). 1843. TYPE: Based on *H. ciliatum* sensu Hook. & Grev. (Icon. Fil. 1:t. 35. 1827), which is based on a specimen collected on St. Vincent (*Guilding*, K not seen).

Sphaerocionium commutatum K. Presl, Hymenophyllaceae 34 (postpr. 126). 1843. TYPE: Based on *H. boryanum* sensu Raddi (Pl. Bras. t. 79, f. 4. 1825), which is based on a specimen collected near Rio de Janeiro (*Raddi*, FI not seen).

?*Hymenophyllum ciliatum* var. *nudipes* Kunze, Linnaea 18:351. 1845. TYPE: Mexico, *Leibold* 72 p. p. (LZ destroyed; isotype B not seen). This mixed collection may be partially referable to *H. crispum*.

?*Hymenophyllum ciliatum* var. *ornifolium* Kunze, *Linnaea* 21:240. 1848. TYPE: Surinam, *Weigelt* (LZ destroyed).

Hymenophyllum remotum v. d. Bosch, *Nederl. Kruid. Arch.* 4:413. 1858. TYPE: A renaming of *H. ciliatum* sensu Hook. & Grev. (*Icon. Fil.* 1:t. 35. 1827), which is based on a specimen collected on St. Vincent (*Guilding*, K not seen).

Hymenophyllum surinamense v. d. Bosch, *Nederl. Kruid. Arch.* 4:414. 1858, nom. superfl. TYPE: Based ultimately on *Trichomanes ciliatum* Swartz, and so based on the type of that name.

Hymenophyllum gardnerianum Sturm in Mart. *Fl. Bras.* 1(2):297. 1859. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Gardner* 213 (BR not seen; isotype P not seen photo 4563).

Hymenophyllum atrovirens Fée & L'Herminier in Fée, *Hist. Foug. Antill.* [Mém. Foug. 11]:120, t. 30, f. 4. 1866, non Colenso, 1844, nec Christ, 1904, nom. illeg. TYPE: Pitou Caraibe, Guadeloupe, *Germain* in 1864 (P or RB not seen).

Hymenophyllum microcarpon Fée, *Crypt. Vasc. Brésil* 1:245, t. 69, f. 3. 1869, non *H. microcarpum* Desv., 1827, nom. illeg. SYNTYPES: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Glaziou* 2268 (P not seen photo 4558) and 3356 (P not seen).

Hymenophyllum caulopteron Fée, *Crypt. Vasc. Brésil* 1:197, t. 70, f. 3. 1869. SYNTYPES: Serra de Estrella, Est. Rio de Janeiro, Brazil, *Glaziou* 1713 (P not seen photo 4561) and 920 (P not seen photo 4560; isosynotype NY not seen); and Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Glaziou* 2269 (P not seen) and 2270 (P not seen photo 4559).

Hymenophyllum ulei Christ & Giesenh. *Flora* 86:85, f. 6, 7. 1899. TYPE: Teresópolis, Serra dos Orgãos, Est. Rio de Janeiro, Brazil, 1000 m, *Ule* 4510 (presumably P not seen; isotypes L not seen photo 2528, US). The locality stated in the original description is in error.

Hymenophyllum elatius Christ in Schwacke, *Pl. Nov. Mineir.* 2:13. 1900. TYPE: S. Antonio, Est. Sta. Catarina, Brazil, *Ule* 206 (P not seen).

Hymenophyllum dimorphum Christ, *Bull. Herb. Boissier* II, 4:941. 1904. TYPE: Alto de Mano Tigre, basin of the Río Diquís, Pcia. Puntarenas, 700 m, *Pittier* (P not seen).

Hymenophyllum ciliatum f. *tuberosum* Rosenst. *Hedwigia* 46:74. 1906, as "*tuberosa*." TYPE: A renaming of *H. ulei* Christ & Giesenh., and so based on the type of that name.

Hymenophyllum ciliatum var. *abbreviatum* Rosenst. *Hedwigia* 56:360. 1915, as "*abbreviata*." TYPE: Ribeira, Est. S. Paulo, Brazil, *Brade* 5169 (S not seen).

Plants epiphytic on trunks, at 0–2000 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca, the Fila Costeña, Loma Prieta (Pcia. Los Santos), Cerro Jefe, and Punta S. Francisco Solano and La Trojita (Depto. Chocó). Also from the Antilles, Mexico to Nicaragua, Trinidad, Venezuela to Bolivia, the Guianas, and Brazil.

266. *Hymenophyllum horizontale* Morton, *Contr. U. S. Natl. Herb.* 29:181. 1947.

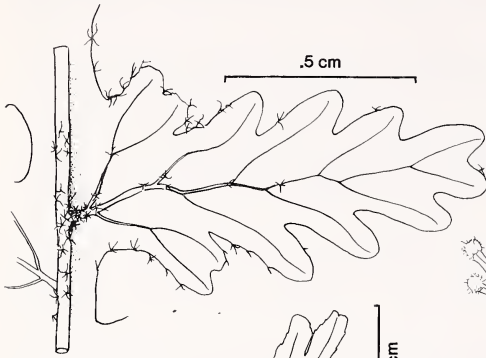
TYPE: La Palma, ca. 1600 m, *Standley* 38114 (US fragm GH).

Plants epiphytic, at (300)1300–1700 m elevation, in forests, from near S. Ramón, La Palma, La Hondura, and Carrillo (all Pcia. S. José), and the vicinity of Orosi and Juan Viñas (both Pcia. Cartago).

267. *Hymenophyllum lanatum* Fée, *Hist. Foug. Antill.* [Mém. Foug. 11]:116, t. 31, f. 3. 1866.

TYPE: Sainte-Rose, Guadeloupe, *L'Herminier* in 1861 (presumably P not seen photo 4592; isotype MO not seen photo 13016).

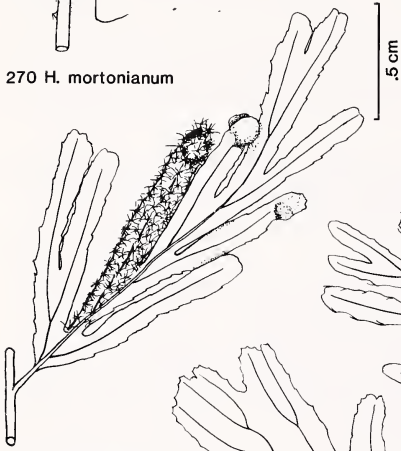
Plants epiphytic, at 1400–1800 m elevation, in the Flora area known only from the upper slopes of Alto del Buey (*Lellinger & de la Sota* 299, COL, CR, LP, US). Also from the Antilles, Mexico, Guatemala, Venezuela, Colombia, and Surinam.



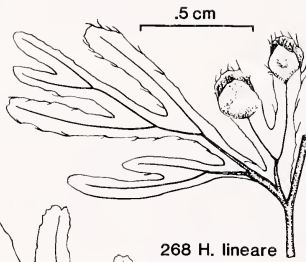
270 *H. mortonianum*



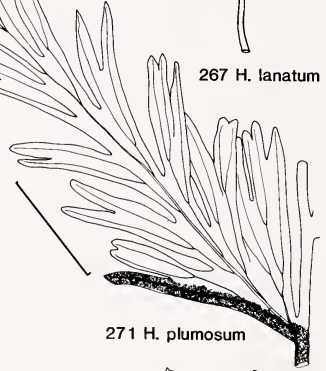
267 *H. lanatum*



272 *H. pulchellum*



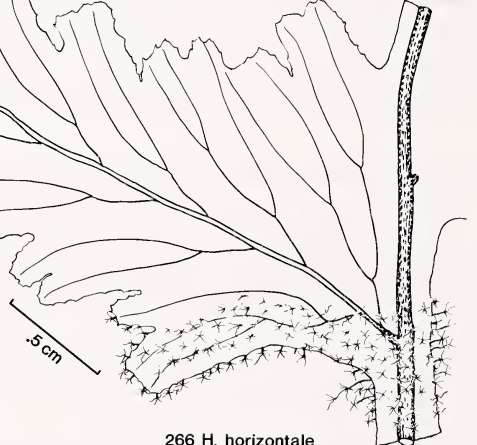
268 *H. lineare*



271 *H. plumosum*



269 *H. microcarpum*



266 *H. horizontale*

268. *Hymenophyllum lineare* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):100. 1801.

Trichomanes lineare Swartz, Nov. Gen. Sp. Pl. Prodr. 137. 1788. TYPE: Jamaica, Swartz (S not seen photo 6191; isotype B-Hb. Willd. 20221 not seen Tryon photo).

Hymenophyllum elegantissimum Fée, Hist. Foug. Antill. [Mém. Foug. 11]:118, t. 29, f. 2. 1866. TYPE: Guadeloupe, *L'Herminier* (P not seen photos 4572, 4573).

Hymenophyllum catherinae Hook. ex Baker, Syn. Fil. 67. 1867. TYPE: Catherine's Peak, Jamaica, Wilson 573 (K not seen fragm US).

Hymenophyllum durandii Bommer & Christ, Bull. Herb. Boissier 4:657. 1896. TYPE: La Palma, Pcia. S. José, 1500–1700 m, Tonduz 9693 (BR not seen photo 4831; isotype CR).

Hymenophyllum lineare var. *dussii* Christ ex Duss, Foug. Antill. Franç. 9. 1903. TYPE: Guadeloupe, 1115–1350 m, Duss 4387 (B or P not seen; isotype US).

Hymenophyllum ceratophylloides Christ, Bull. Herb. Boissier II, 4:942. 1904. LECTOTYPE: Costa Rica, Wercklé 280 (P not seen), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:716. 1977).

Plants epiphytic, at 900–1600 m elevation, in forests, from Monteverde, the Cordillera Central, the Fila Costeña, and the upper slopes of Alto del Buey. Also from Cuba, Jamaica, Puerto Rico, the Lesser Antilles, and Guatemala.

269. *Hymenophyllum microcarpum* Desv. Mém. Soc. Linn. Paris 6:333. 1827.

Hymenophyllum beyrichianum Kunze, Linnaea 9:108. 1834. TYPE: Pampayacu, Depto. Huánuco, Peru, July 1829, Poeppig (LZ destroyed).

Hymenophyllum organense Hook. Sp. Fil. 1:90, t. 32B. 1844. TYPE: Organ Mountains, Est. Rio de Janeiro, Brazil, Gardner 210 (K not seen; isotype P not seen photo 4597).

Hymenophyllum pteropodium v. d. Bosch, Nederl. Kruid. Arch. 5(3):187. 1863. SYNTYPES: Quito, Pcia. Pichincha, Ecuador, Cumig 23 (B not seen) and Jameson 109 (K not seen).

Hymenophyllum lindigii Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:196 (repr. 278). 1864. TYPE: Fusagasugá, Depto. Cundinamarca, Colombia, Lindig 122 (B not seen).

Hymenophyllum notabile Fée, Crypt. Vasc. Brésil 1:193, t. 69, f. 2. 1869. SYNTYPES: Brazil, Glaziou 1714 (P not seen photo 4602) and 2271 (P not seen photo 4603).

Hymenophyllum contractile Sodiro, Anales Univ. Quito 6(45):151 (repr. 22). 1892. TYPE: Nanegal, Pcia. Pichincha, Ecuador, Sodiro (Hb. Sodiro not seen fragm US).

Hymenophyllum kaieteurum Jenm. Ferns Brit. W. Ind. Guiana 15. 1898. TYPE: "Forests of the Potaro river and other regions," Guyana, Jenman (NY).

Hymenophyllum angustifrons Christ, Bull. Herb. Boissier II, 4:940. 1904. SYNTYPES: Cañas Gordas, Pcia. Puntarenas, Pittier 10984 (P not seen; isotype US); and Páramo de Guanacas, Depto. Cauca, Colombia, 2000–2500 m, Lehmann 6414 (P? not seen; isotypes UC, US).

Hymenophyllum microcarpum var. *lanceolatum* Morton, Contr. U. S. Natl. Herb. 29:163. 1947. TYPE: Vara Blanca de Sarapiquí, Pcia. Heredia, 1340 m, Skutch 3639 (US).

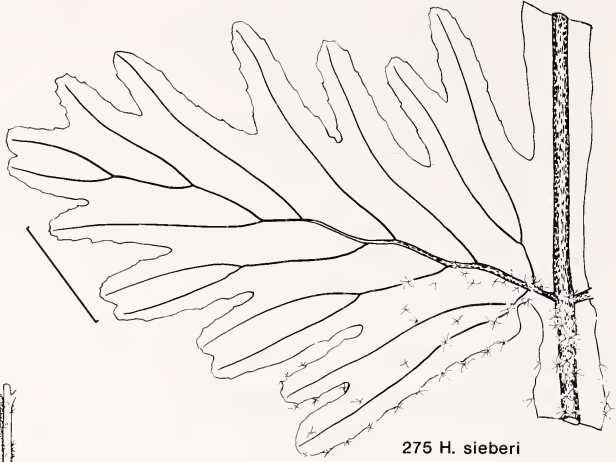
TYPE: Hispaniola, collector unknown (P-Hb. Desv. not seen photo BM not seen).

Plants epiphytic on trunks or rarely epipetric, at (400)900–2000 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña, near Sta. Fé, Cerro Pirre, and Alto del Buey and the upper Río S. Juan region. Also from the Greater Antilles, Dominica, Mexico, Guatemala, Honduras, Nicaragua, Venezuela to Bolivia, Guyana, and Brazil.

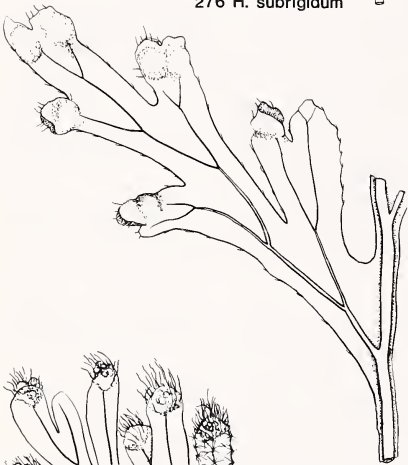
FIGS. 266–272. *Hymenophyllum*. FIG. 266. Proximal median pinna of *H. horizontale*, Brade & Brade 627. FIG. 267. Frond of *H. lanatum*, Sherring, Grenada. FIG. 268. Median pinna of *H. lineare*, Brade & Brade 61. FIG. 269. Median pinna of *H. microcarpum*, Stork 4822. FIG. 270. Pinna of *H. mortonianum*, Lellinger & de la Sota 425. FIG. 271. Median pinna of *H. plumosum*, Maxon 5693. FIG. 272. Median pinna of *H. pulchellum*, Lankester 648b.



276 *H. subrigidum*



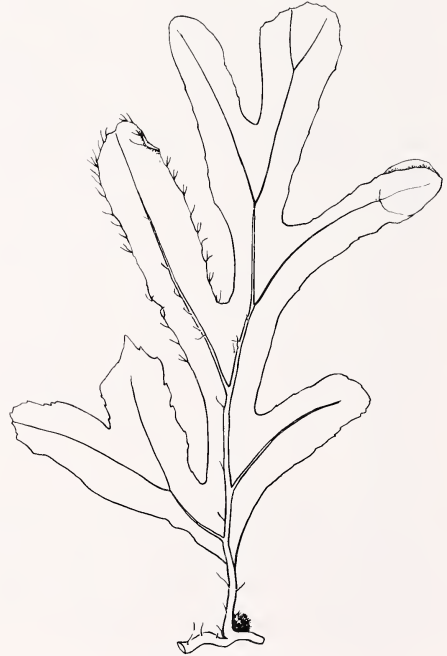
275 *H. sieberi*



274 *H. semiglabrum*



277 *H. trichophyllum*



273 *H. saenzianum*

270. *Hymenophyllum mortonianum* Lellinger, Proc. Biol. Soc. Wash. 98:385, f. 15. 1985.

TYPE: Mojarras de Tadó, 8.5 km east of Istmina, Depto. Chocó, 150–250 m, *Lellinger & de la Sota* 425 (US; isotypes COL, CR, HUA, LP).

Plants epiphytic, at 100–300 m elevation. Known only from the type.

271. *Hymenophyllum plumosum* Kaulf. Enum. Fil. 267. 1824.

Sphaerocionium aureum K. Presl, Hymenophyllaceae 57 (postpr. 149). 1843. TYPE: Serra da Estrella, Est. Rio de Janeiro, Brazil, *Beyrich* (Hb. Beyrich not seen).

TYPE: Brazil, *Chamisso* (LE? not seen).

Plants epiphytic, at (1000)1200–2300 m elevation, in forests, from the Cordillera Central, the valley of the Río Grande de Orosi (Pcia. Cartago), and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Colombia to Bolivia, and Brazil.

272. *Hymenophyllum pulchellum* Schlechtend. & Cham. Linnaea 5:618. 1830.

Hymenophyllum chrysothrix Sturm in Mart. Fl. Bras. 1(2):298. 1859. TYPE: Serra da Estrella, Est. Rio de Janeiro, Brazil, *Martius* (BR not seen photo 4828).

Hymenophyllum silveirae Christ in Schwacke, Pl. Nov. Minier. 2:14. 1900. SYNTYPES (all from Est. Minas Gerais, Brazil): Serra do Campestre, *Silveira* 2332 (P not seen); Serra das Camarinhas, *Schwacke* 11085 (P not seen); and Itacolumi, *Schwacke* 12528 (P not seen photo 4619).

Hymenophyllum pannosum Christ, Bull. Herb. Boissier II, 5:250. 1905. TYPE: Costa Rica, *Wercklé* (P not seen; isotype US fragm NY).

Hymenophyllum lineare var. *brasiliense* Rosenst. Hedwigia 46:74. 1906. TYPE: Sta. Cruz, Est. Rio Grande do Sul, Brazil, *Juergens* 137 (*Ros. Fil. Austrobras. Exs. 175*) (S not seen; isotypes NY, US).

Hymenophyllum lineare f. *tuberosum* Rosenst. Hedwigia 46:74. 1906, as “*tuberosa*.” TYPE: Rio Grande, Est. S. Paulo, Brazil, *Wacket* (*Ros. Fil. Austrobras. Exs. 175*) (S not seen; isotype US).

Hymenophyllum lineare f. *pseudocarpum* Rosenst. Hedwigia 46:74. 1906, as “*pseudocarpa*.” TYPE: Rio Grande, Est. S. Paulo, Brazil, *Wacket* (*Ros. Fil. Austrobras. Exs. 176*) (S not seen; isotype US).

TYPE: Cuesta Grande, Jalacingo, Edo. Veracruz, Mexico, *Schiede & Deppe* 807 (B-Hb. Willd. 20239 not seen microfiche S. I. Library; isotypes BM, LE neither seen).

Plants epiphytic, at 1600–1900 m elevation, in the Flora area known only from Las Nubes, Pcia. S. José (*Knight*, US) and from Pacayas, Pcia. Cartago (*Lankester* 648b, US). Also from Mexico, Guatemala, Belize, Honduras, and Brazil.

273. *Hymenophyllum saenzianum* L. D. Gómez, Revista Biol. Trop. 17:107, f. 7. 1970.

TYPE: Madreselva, Cordillera de Talamanca, Pcia. Cartago, 2800 m, *Gómez* *PtC-47568* (CR).

Plants epiphytic on trunks, at 1200–2800 m elevation, in forests, from the northern end of the Cordillera de Talamanca.

FIGS. 273–277. *Hymenophyllum*. FIG. 273. Frond of *H. saenzianum*, Mickel 3452. FIG. 274. Median pinna of *H. semiglabrum*, Cornman 1175. FIG. 275. Proximal median pinna of *H. sieberi*, Muench 11, Mexico. FIG. 276. Median pinna of *H. subrigidum*, Scamman 5853. FIG. 277. Median pinna of *H. trichophyllum*, Farrar CR-225.

The type specimen is juvenile; more fully developed fronds are ovate, with ca. 6 alternate, simple to 2-forked pinnae. The ultimate segments are unusual in being up to 2 mm wide.

274. *Hymenophyllum semiglabrum* Rosenst. Repert. Spec. Nov. Regni Veg. 9:67. 1910.

TYPE: La Palma, Pcia. S. José, 1400 m, *Brade & Brade* 395 (*Ros. Fil. Costar. Exs. 174*) (S not seen photo 6193 fragm US; isotypes NY, UC).

Plants epiphytic, at 1000–1500 m elevation, in forests, known only from the type, from Sta. Clara de Cartago, Pcia. Cartago (*Maxon 8178 p. p.*, US), and from the vicinity of Boquete (*Cornman 1175*, US).

275. *Hymenophyllum sieberi* (K. Presl) v. d. Bosch, Nederl. Kruid. Arch 4:414. 1858.

Sphaerocionium sieberi K. Presl, *Hymenophyllaceae* 58 (postpr. 150). 1843. TYPE: Martinique, Kohaut (*Sieber exs. 71*) (PRC not seen).

Hymenophyllum wercklei Christ, Bull. Herb. Boissier II, 4:940. 1904. LECTOTYPE: Costa Rica, *Wercklé 247* (P not seen; possible islectotype US fragm NY), chosen by Morton (*Contr. U. S. Natl. Herb.* 29:179. 1947).

Plants epiphytic, at (300)900–1700 m elevation, in forests, from the Cordillera Central, the valley of the Río Reventazón, and Platanillo (Pcia. Cartago). Also from Puerto Rico, the Lesser Antilles, Mexico to Nicaragua, and Venezuela.

276. *Hymenophyllum subrigidum* Christ, Bull. Herb. Boissier II, 5:260. 1905.

Hymenophyllum atrovirens Christ, Bull. Herb. Boissier II, 4:941. 1904, non Colenso, 1844, nec Fée & L'Herminier in Fée, 1866, nom. illeg. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen; isotype US fragm NY).

TYPE: A renaming of *H. atrovirens* Christ, and so based on the type of that name.

Plants epiphytic on trunks, at (800)1400–2400 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and Cerro Pirre.

This species is peculiar in that the sinuses between adjacent segments or pinnules are not so deep as is usual in *Hymenophyllum*, and so the dichotomies of the lamina have a webbed appearance.

277. *Hymenophyllum trichophyllum* H.B.K. Nov. Gen. Sp. 1:27 (fol. 22). 1816.

Hymenophyllum procerum v. d. Bosch, Nederl. Kruid. Arch. 4:409. 1858, nom. nud. Based on *H. pulchellum* sensu Mett. (*Fil. Lechl.* 1:25. 1859), which lacks a description.

Hymenophyllum moritzianum Sturm in Mart. Fl. Bras. 1(2):295. 1859. TYPE: Near Mérida, Edo. Mérida, Venezuela, *Moritz 344 p. p.* (BR? not seen).

Hymenophyllum eriophorum v. d. Bosch, Nederl. Kruid. Arch. 5(3):180. 1863. TYPE: “Andes of Quito,” Pcia. Pichincha, Ecuador, *Jameson 82* (not seen).

Hymenophyllum trichophyllum var. *contractum* Hieron. *Hedwigia* 45:226. 1906, as “*contracta*.” TYPE: Mt. Tolima, Colombia, *Stuebel 43* (B not seen).

TYPE: Between Cocollar and El Guardia de S. Agustín, probably Edo. Monagas, Venezuela, *Humboldt & Bonpland* (P not seen).

Plants epiphytic, at 1500–3500 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Guatemala, Venezuela to Bolivia, and Guyana.

HYMENOPHYLLUM subg. MECODIUM Copel.

277a. *Hymenophyllum apiculatum* Mett. ex Kuhn, *Linnaea* 35:391. 1868.

TYPE: Near Colonia Tovar, Edo. Aragua, Venezuela, *Fendler* 32 (B not seen; isotype US).

Plants epiphytic, at 1000 m elevation, in the Flora area known only from Cerro Jefe (*Valdespino, Aranda & Rios 344b*, PMA not seen, US; *Valdespino & Aranda 171*, PMA not seen, UC). Also from Venezuela and Colombia.

278. *Hymenophyllum asplenioides* (Swartz) Swartz, *J. Bot. (Schrader)* 1800(2):98. 1801.

Trichomanes asplenioides Swartz, *Nov. Gen. Sp. Pl. Prodr.* 136. 1788. TYPE: Jamaica, *Swartz* (S not seen photo 6160; isotype B-Hb. Willd. 20217 not seen Tryon photo).

Plants epiphytic on trunks, at 1000–2000 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, and the Cordillera de Talamanca from Copey de Dota (Pcia. S. José) to the vicinity of Boquete. Also from the Greater Antilles, Mexico, Guatemala, Honduras, Nicaragua, Trinidad, Venezuela, Guyana, and Brazil.

279. *Hymenophyllum brevifrons* Kunze, *Bot. Zeitung (Berlin)* 5:185. Mar 1847.

Hymenophyllum tablaziense Christ, *Bull. Soc. Bot. Genève* II, 1:216. 1909. TYPE: Cerro Tablazo, 1900 m, *Brade 155* (P not seen; isotypes UC, US).

TYPE: French Guiana, *Leprieur 235* (LZ destroyed; isotype B not seen, isotype frags NY, US). See Kunze (*Farnkräuter* 1:236, t. 96, f. 2. Sept 1847) for a statement of the type.

Plants epiphytic, at 100–1000(1900) m elevation, in forests, from the Cordillera de Tilarán, north of S. Ramón, Finca La Selva (Pcia. Heredia), Cerro Tablazo, the vicinity of S. Isidro del General, and the Canal Zone and adjacent Pcia. Panama. Also from Cuba, Hispaniola, Guatemala, Belize, Guyana, and French Guiana.

This species is allied to *H. brevistipes* Liebm. of Mexico and Honduras, which has the stipes narrowly alate almost to the base, and to *H. abruptum* Hook. of the Greater Antilles, which has fronds that are a little larger and less divided.

280. *Hymenophyllum contortum* v. d. Bosch, *Nederl. Kruid. Arch.* 5(3):170. 1863.

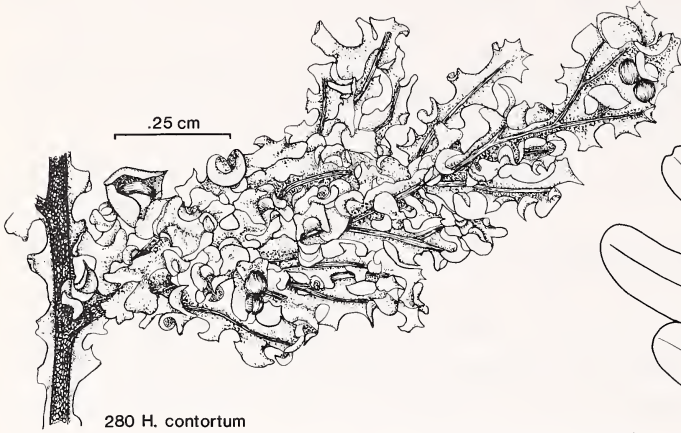
TYPE: Aguacate, Pcia. S. José, *Hoffmann* (B not seen).

Plants epiphytic, at 900–1500 m elevation, in forests, from Aguacate, Peralta, and La Palma (Pcia. S. José), Vara Blanca (Pcia. Heredia), and Platanillo and near Juan Viñas (both Pcia. Cartago). Also from Hispaniola, Mexico, and Guatemala.

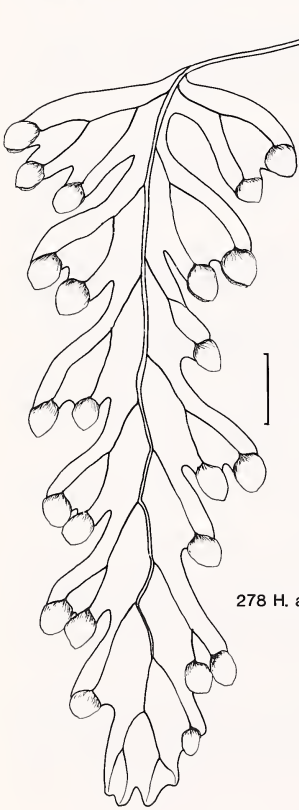
This species is closely related or possibly conspecific with the South American *H. fendlerianum* Sturm in Mart. (*Fl. Bras.* 1(2):291. 1859), which has longer and narrower fronds with even more contorted segments that seem invariably to be the host of a black, bristle-like fungus.

281. *Hymenophyllum costaricanum* v. d. Bosch, *Nederl. Kruid. Arch.* 5(3):161. 1863.

Hymenophyllum alfredii Rosenst. *Repert. Spec. Nov. Regni Veg.* 22:4. 1925. TYPE: Cisma, near S. Jerónimo, Pcia. Alajuela, 2100 m, *Brade & Brade 601* (S not seen; isotypes NY, UC, US).



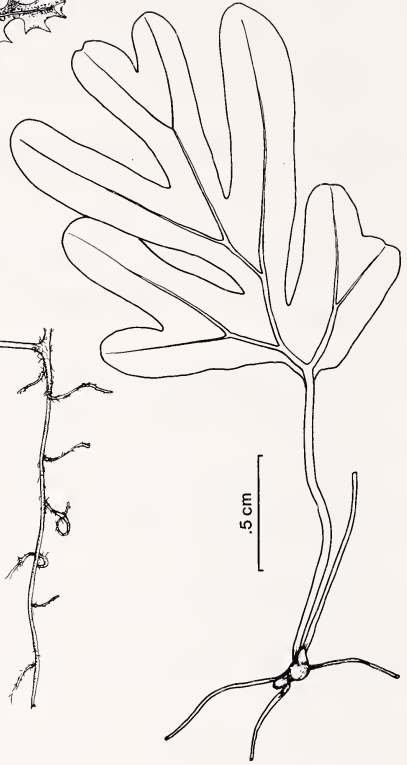
280 *H. contortum*



278 *H. asplenioides*



281 *H. costaricanum*



279 *H. brevifrons*

Hymenophyllum costaricanum var. *emarginatum* Rosenst. Repert. Spec. Nov. Regni Veg. 22:4. 1925. TYPE: La Palma, Pcia. S. José, 1450 m, *Brade & Brade* 608 (S not seen photo 6163; isotypes UC, US).

TYPE: Volcán Barba, Pcia. Heredia, *Hoffmann* (B not seen; isotypes L not seen photo 2478, P not seen photo 4564, UC, US).

Plants epiphytic on trunks, at (400)1000–2900 m elevation, in forests, from the Cordillera Central, Cerro Tablazo, the Cordillera de Talamanca to Pcia. Chiriquí, and northwest of Sta. Fé.

This species is often misidentified as *H. polyanthos*, but differs in having entirely exalate stipes. However, it is possible that a few specimens from the Flora area could be referable to *H. polyanthos* var. *protrusum* (see a comment under *H. polyanthos*). The pinnae of *H. costaricanum* are less crowded and often its laminae are longer and more linear than are those of *H. polyanthos* var. *polyanthos*. Two small, sterile specimens found at 200–900 m elevation in the Chocó (*Killip* 35339 and *Lellinger & de la Sota* 195, both US) appear to be a distinct species related to *H. costaricanum*, but are insufficiently known to be described.

282. *Hymenophyllum farallonense* Hieron. Bot. Jahrb. Syst. 34:430. 1904.

TYPE: Farallones de Cali, Depto. Valle, Colombia, 2000 m, *Lehmann* 1980 (B not seen; isotype US).

Plants epiphytic, at 900–1800 m elevation, in forests, in the Flora area known only from Alto del Buey (*Lellinger & de la Sota* 263, LP, US, and 319, COL, LP, US).

This species is closely related, and may be conspecific with, *H. trianae* Hieron. (Bot. Jahrb. Syst. 34:429. 1904), which is said to have longer and wider ultimate segments and larger involcures.

283. *Hymenophyllum myriocarpum* Hook. Sp. Fil. 1:106, t. 37D. 1844.

TYPE: Colombia, *Hartweg* 1530 (K not seen; isotypes BM not seen, P not seen photo 4601).

Plants epiphytic, at 1500–3300 m elevation, in forests and open areas, from S. Pedro de S. Ramón (Pcia. Alajuela), the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico, Guatemala, Honduras to Nicaragua, and Venezuela to Bolivia.

284. *Hymenophyllum nigrescens* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:292 (repr. 140). 1849.

Sphaerocionium nigricans K. Presl ex Klotzsch, Linnaea 18:536. 1845, non *Hymenophyllum nigricans* Colla, 1836. SYNTYPES: Colonia Tovar, Edo. Aragua, Venezuela, *Moritz* 268 (B not seen) and 268b (B not seen); and Peru, *Dombey* 87 (B? not seen; isotype P not seen).

Hymenophyllum atosanguineum v. d. Bosch, Nederl. Kruid. Arch. 5(3):165. 1863. TYPE: Aguacate, Pcia. S. José, *Hoffmann* (B not seen).

Hymenophyllum laciniosum Christ, Bull. Herb. Boissier II, 4:938. 1904. TYPE: Costa Rica, *Wercklé* (P not seen). A paratype from Volcán Sotara, Depto. Cauca, Colombia (*Lehmann* 3671, P not seen; isoparatype US) is neither *H. nigrescens* nor *H. polyanthos*.

FIGS. 278–281. *Hymenophyllum*. FIG. 278. Frond of *H. asplenoides*, *Killip* 5399. FIG. 279. Frond of *H. brevifrons*, *Brade* 155. FIG. 280. Median pinna of *H. contortum*, *Lankester* 592. FIG. 281. Median pinna of *H. costaricanum*, *Maxon* 5576.



282 *H. farallonense*



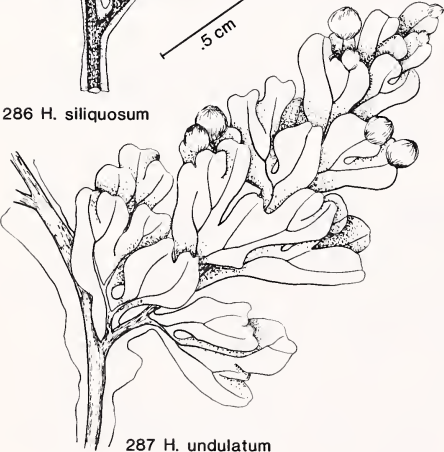
283 *H. myriocarpum*



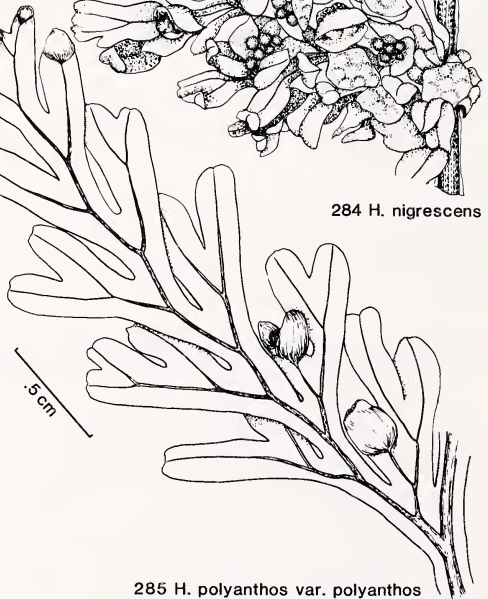
286 *H. siliquosum*



284 *H. nigrescens*



287 *H. undulatum*



285 *H. polyanthos* var. *polyanthos*

Hymenophyllum carnosum Christ, Bull. Herb. Boissier II, 4:938. 1904. TYPE: Costa Rica, Wercklé in 1903 (P not seen photo 17048).

?*Hymenophyllum nigrescens* var. *gracile* Rosenst. Meded. Rijks-Herb. 19:4. 1913, as “*gracilis*.” TYPE: Cordillera de Sta. Cruz, Depto. Sta. Cruz, Bolivia, Herzog 3559/a (B? not seen). I have not seen any undoubted specimens of *H. nigrescens* from Colombia to Bolivia, and so this variety may be a synonym of *H. polyanthos*.

Hymenophyllum contextum Rosenst. Repert. Spec. Nov. Regni Veg. 22:3. 1925. LECTOTYPE: La Palma, Pcia. S. José, 1400 m, Brade & Brade 5 (US; islectotype S not seen), chosen by Lellinger (Mem. New York Bot. Gard. 38:14. 1984).

LECTOTYPE: Near Chinautla, Edo. Puebla, Mexico, 7000 ft, Liebmann Fl. Mex. 537 (C not seen; islectotypes BM, K, P none seen), chosen by A. R. Smith (Fl. Chiapas 2:133. 1981).

Plants epiphytic on trunks and branches, at (500)1200–2600(3300) m elevation, in forests and open areas, from the Cordillera de Tilarán, the Cordillera Central, Cerro Carpintera, Cerro Tablazo, the Fila de Cedral, the Cordillera de Talamanca to Cerro Chirripó, and northwest of Sta. Fé. Also from Mexico, Honduras, Venezuela, and perhaps Colombia, Peru, Bolivia, and Brazil.

For a comment on the taxonomy of this species, see *H. polyanthos*.

285. *Hymenophyllum polyanthos* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):102. 1801, var. *polyanthos*.

Trichomanes polyanthos Swartz, Nov. Gen. Sp. Pl. Prodr. 137. 1788. TYPE: Jamaica, Swartz, (S not seen photo 6178; isotypes B-Hb. Willd. 20235, 20237 not seen Tryon photos, BM not seen photo 6586).

?*Trichomanes clavatum* Swartz, Nov. Gen. Sp. Pl. Prodr. 137. 1788. TYPE: Jamaica, Swartz (SBT not seen). Most of the Jamaican material determined as *H. polyanthos* has exalate stipes, in contrast to the Central and South American specimens.

Hymenophyllum jalapense Schlechtend. & Cham. Linnaea 5:619. 1830. TYPE: Near Jalapa, Edo. Veracruz, Mexico, Schiede [812] (B not seen; isotypes BM not seen, L not seen photo 2514, LE not seen).

Hymenophyllum millefolium Schlechtend. & Cham. Linnaea 5:620. 1830. TYPE: Jalacingo, Edo. Veracruz, Mexico, Schiede & Deppe [813] (B not seen; isotypes BM not seen, HBG? not seen, fragm US).

Hymenophyllum grevilleanum K. Presl, Hymenophyllaceae 32 (postpr. 124). 1843. TYPE: Plate 128 of Hooker and Greville’s “Icones Filicum,” which illustrates specimens collected on Jamaica (Swartz, S not seen) and on St. Vincent (Goulding, K not seen).

Hymenophyllum fraternum K. Presl, Hymenophyllaceae 54 (postpr. 146), t. 12B. 1843. TYPE: Jamaica, collector unknown (PRC not seen).

Hymenophyllum poeppigianum K. Presl, Hymenophyllaceae 54 (postpr. 146). 1843. TYPE: Pampayacu, Depto. Huánuco, Peru, Poeppig (PRC not seen).

Sphaerocionium breutelii K. Presl, Gefässbündel Farrne 29 (postpr. 357), t. 5, f. 19. 1847. TYPE: Mt. Miseri, St. Kitts, Breutel (PRC not seen).

Hymenophyllum imbricatum Kunze ex Sturm in Mart. Fl. Bras. 1(2):287. 1859, non Blume, 1828, nom. illeg. SYNTYPES: Prov. Sebastianopolis, Est. Rio de Janeiro, Brazil, Martius & Langsdorff (BR not seen); and Serra do Cubatão, Est. S. Paulo, Brazil, Lindberg (BR not seen).

FIGS. 282–287. *Hymenophyllum*. FIG. 282. Median pinna of *H. farallonense*, Lehmann 1980, Colombia. FIG. 283. Median pinna of *H. myriocarpum*, Chrysler 5113. FIG. 284. Median pinna of *H. nigrescens*, Knight. FIG. 285. Median pinna of *H. polyanthos* var. *polyanthos*, Stork 4823. FIG. 286. Median pinna of *H. siliquosum*, Maxon 7984. FIG. 287. Median pinna of *H. undulatum*, Standley 35202.

Hymenophyllum pusillum Schott ex Sturm in Mart. Fl. Bras. 1(2):289. 1859. SYNTYPES: Ilha Sta. Catarina, Est. Sta. Catarina, Brazil, *Chamisso* (BR not seen); Serra do Cubatão, Est. S. Paulo, Brazil, *Sellow* (BR not seen); Est. Goiás, Brazil, *Pohl 1419* (BR not seen); and Mt. Kanuku, Guyana, *Rich. Schomburgk 1180* (B not seen).

Hymenophyllum sturmii v. d. Bosch, Nederl. Kruid. Arch. 5(3):152. 1863. SYNTYPES: Serra dos Orgãos, Est. Rio de Janeiro, Brazil, "*Gaudichaud, Vauthier, Beyrich alii*" (none seen).

Hymenophyllum fecundum v. d. Bosch, Nederl. Kruid. Arch. 5(3):153. 1863. TYPE: Aguacate, Pcia. S. José, Hoffmann (B not seen).

Hymenophyllum botryoides v. d. Bosch, Nederl. Kruid. Arch. 5(3):160. 1863. TYPE: Mexico, Galeotti 6394 (BR or K not seen photo BM not seen; isotype US).

?*Hymenophyllum matthewsii* v. d. Bosch, Nederl. Kruid. Arch. 5(3):162. 1863. SYNTYPES: Peru, Matthews (L? not seen; isosyntypes P not seen photos 4607, 4611); and Quito, Pcia. Pichincha, Ecuador, *Cuming* (B not seen). Pinnules atypical for *H. polyanthos*.

Hymenophyllum viridissimum Fée, Crypt. Vasc. Brésil 1:194, t. 49, f. 3. 1869. SYNTYPES: Brazil, Glaziou 1718 and 2050 (both P not seen photo 4609).

Hymenophyllum mazei Fourn. ex Christ in Krug in Urban, Bot. Jahrb. Syst. 24:85. 1897. SYNTYPES: Guadeloupe, *Mazé 461* (P? not seen) and *651 p. p.* (P? not seen).

Hymenophyllum polyanthos var. *reductum* Jenm. Ferns Brit. W. Ind. Guiana 8. 1898. TYPE: Not stated.

Hymenophyllum subdeltoideum Fée ex Christ, Bull. Herb. Boissier II, 2:322. 1902. TYPE: Est. Sta. Catarina, Brazil, *Ule 3351* (P not seen).

Hymenophyllum trichomanoides var. *subalatum* Rosenst. Repert. Spec. Nov. Regni Veg. 22:4. 1925. TYPE: Cerro Tablazo, 1900 m, *Brade & Brade 396* (S not seen; isotype US).

Mecodium mexiae Copel. Univ. Calif. Publ. Bot. 19:294, t. 48. 1941. TYPE: Near confluence of the Río Cayumba with the Río Huallaga, Depto. Huánuco, Peru, 875 m, *Mexia 8282* (MICH not seen; isotype MO).

Plants epiphytic on trunks and branches, at (600)900–3300 m elevation, in forests and open areas, from the Cordillera Central, Cerro Tablazo, the Cordillera de Talamanca to Pcia. Chiriquí, the valley of the Río General, the Peninsula de Osa, Cerro Jefe, Cerro Pirre, and the northern half of the Chocó. Also from throughout tropical America.

This species and *H. nigrescens* are not strongly separated, and are part of a large and variable complex that is much in need of critical study. Proctor (Fl. Less. Antill. 2:76–77. 1977) distinguished *H. polyanthos* var. *protrusum* (Hook.) Farw., with pendent, elongate, apparently indeterminate laminae, as seen in *Valerio 214* (US) from Volcán Barba and in *Mickel 3220* (US) from the Cerro de la Muerte. The tendency toward indeterminateness occurs sporadically in Costa Rican material, and in my opinion these specimens are not worthy of taxonomic recognition (although the Antillean ones very well may be). Therefore, I have excused synonyms of var. *protrusum* from the synonymy.

286. *Hymenophyllum siliquosum* Christ, Bull. Herb. Boissier II, 4:938. 1904.

LECTOTYPE: Costa Rica, *Wercklé 289* (P not seen), chosen by Sellinger (Proc. Biol. Soc. Wash. 89:716. 1977). The other syntype, Costa Rica, *Wercklé 307* (P not seen; isosyntype CR) is *H. lineare*, a species of subg. *Leptocionium*.

Plants epiphytic, at (1100)1500–1700 and 2800–3200 m elevation, in forests, from La Palma and vicinity (Pcia. S. José), the Cerro de la Muerte, and Cerro Chirripó. Also from Mexico.

287. *Hymenophyllum undulatum* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):101. 1801.

Trichomanes undulatum Swartz, Nov. Gen. Sp. Pl. Prodr. 137. 1788. TYPE: Jamaica, Swartz (S not seen photo 6172; isotypes B-Hb. Willd. 20238 not seen Tryon photo, BM not seen, P not seen photo 4623).

Hymenophyllum flaccidum v. d. Bosch, Nederl. Kruid. Arch. 4:400. 1858, nom. superfl. TYPE: Based on *H. undulatum* sensu Hedw. (Fil. Gen. Sp. t. XI. 1799), which was based on *T. undulatum* Swartz.

Hymenophyllum undulatum var. *regenerans* C. Chr. in Aspl. Ark. Bot. 20A(7):8. 1926. TYPE: Between S. Felipe and El Chaco, S. Yungas, Depto. La Paz, Bolivia, 2500 m, *Asplund* 1439 (C or S not seen).

Plants epiphytic, at 1200–3300 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca. Also from the Greater Antilles, Mexico to Honduras, Venezuela, Colombia, Ecuador, perhaps Bolivia, and Brazil.

43. TRICHOMANES L.

Plants epiphytic, epipetric, or terrestrial; rhizomes erect or ascending and strongly rooted or long-creeping and with rather inconspicuous roots, hairy, the hairs multicellular, often bristle-like, dark brown, borne especially at the apex; fronds minute (in subg. *Didymoglossum*) to small or rarely medium-sized, usually monomorphic; stipes obsolete to longer than the laminae, commonly alate distal to the base, sometimes glabrous except for hairs at the base, or with pale, simple hairs (in subg. *Achomanes*) or blackish, simple, bifid, or stellate hairs (in subg. *Didymoglossum*); laminae simple to decompound, orbicular or flabellate to ovate or oblong, for the most part only 1 cell thick, the rachis commonly entirely alate or the laminae flabelliform and the midrib obsolete, usually glabrous on the lamina surface and often on the veins, or with hairs like those of the stipes; veins pinnately or flabellately branched, sometimes connected by or accompanied by thinner, false veins parallel to the lamina margin or to the true veins; sori marginal, borne at pinna apices or laterally on the pinnae; sporangia borne on a long, exserted setiform receptacle surrounded by a tubular, sometimes 2-lipped involucre that is free to almost wholly immersed in the lamina tissue; sporangia short-stalked.

Mostly pantropical in wet lowlands; ca. 320 species.

LELLINGER, D. B. 1984. Hymenophyllaceae (Filicales) in B. Maguire and collaborators. The botany of the Guayana Highland—Part XII. Mem. New York Bot. Gard. 38:9–46.

MORTON, C. V. 1968. The genera, subgenera, and sections of the Hymenophyllaceae. Contr. U. S. Natl. Herb. 38:153–214.

WESSELS BOER, J. G. 1962. The New World species of *Trichomanes* sect. *Didymoglossum* and *Microgonium*. Acta Bot. Neerl. 11:277–330.

1. Fronds simple to pinnate-pinnatifid; venation catadromous; sori terminating terminal segments of pinnae and pinnules; segment margins often ciliate or with sessile, stellate hairs..3.

1. Fronds 2-pinnate to 4-pinnate-pinnatifid; venation anadromous; sori terminating lateral segments of pinnae and pinnules; segment margins usually not ciliate or with stellate hairs..2.

2(1). Rhizomes long-creeping, the fronds distant; plants usually epiphytic; stipes 0.5–1(1.5) mm in diam. (subg. *Trichomanes*)..6.

2(1). Rhizomes erect or short-creeping, the fronds clustered; plants usually terrestrial; stipes 0.75–2.5 mm in diam. (subg. *Pachychaetum*)..4.

3(1). Fronds less than 5(8) cm long, simple to bipinnatifid but not truly pinnate; false veins present between the true veins or submarginal; plants epiphytic or rarely epipetric (subg. *Didymoglossum*)..30.

3(1). Fronds more than 5 cm long, deeply pinnatifid to 2-pinnate-pinnatifid; false veins absent (except in *T. pinnatum* and apparently in *T. ankersii* and *T. tuerckheimii*); plants often terrestrial (subg. *Achomanes*)..13.

4(2). Rachises entirely alate, the ala more than 0.5 mm wide; stipes 1–2.5 mm in diam.; laminae 3-pinnate, 15–25 cm long, iridescent blue-green in life, ca. 3 cells thick.

320. *T. elegans*

4(2). Rachises not or slightly alate, the ala less than 0.5 mm wide; stipes 0.25–1.25 mm in diam.; laminae 3-pinnate to 4-pinnate-pinnatifid, 5–15(18) cm long, 1 cell thick..5.

5(4). Stipes 0.75–1.25 mm in diam., usually not alate; cells of the lamina with occluded lumina; involucre conical, 1–1.5 mm long, 0.75–1 mm wide.

321. *T. rigidum*

5(4). Stipes 0.5–0.6 mm in diam., always alate; cells of the lamina with clear lumina; involucre conical, 0.75–1 mm long, 0.4–0.5 mm wide.

322. *T. sprucei*

6(2). Segments normally expanded, mostly more than 0.5 mm wide, the cells of the lamina in more than 6 rows on each side of the midrib..8.

6(2). Segments narrow to filiform, up to 0.5 mm wide, the cells of the lamina usually in 2–6 rows on each side of the midrib..7.

7(6). Segments filiform, the lamina cells in often only 2 or 3 rows on each side of the midrib; involucre alate and not on naked axes. Laminae reduced nearly to the veins; fronds 3–4-pinnate; ultimate segments mostly less than 0.5 cm long.

323. *T. capillaceum*

7(6). Segments narrow, the lamina cells usually in 4–6 rows on each side of the midrib; involucre exalate and on naked axes. Fronds 3–4-pinnate; ultimate segments usually less than 0.5 cm long.

322a. *T. angustatum*

8(6). Fronds 5–15 cm long; rhizomes ca. 0.5 mm in diam..11.

8(6). Fronds (10)15–50 cm long; rhizomes 1–2 mm in diam..9.

9(8). Sterile lamina lobes usually broad and low, (1)2–4 mm wide; laminae pinnate-pinnatifid to 2-pinnate-pinnatifid. Stipes 0.2–1(2) cm long; involucre flared at the apex.

329. *T. rupestre*

9(8). Sterile lamina lobes narrow and long, 0.25–0.5 mm wide; laminae 2-pinnate to 4-pinnate..10.

10(9). Involucre not or scarcely flared at the apex; laminae broad, usually truncate at the base; stipes 3–12 cm long.

328. *T. radicans*

10(9). Involucre decidedly flared at the apex; laminae narrow, usually tapered at the base; stipes 1–6 cm long.

324. *T. collariatum*

11(8). Lamina segments slightly folded parallel to the veins; involucre ca. 2 mm long, 1 mm wide, conical, only slightly flared at the apex.

327. *T. pyxidiferum*

11(8). Lamina segments plane, not folded parallel to the veins; involucre ca. 1.5 mm long, 0.5 mm wide, tubular, greatly flared at the apex..12.

12(11). Stipes mostly alate throughout; pinnae approximate to imbricate; ala of the rachis 0.25–0.5 mm wide; fertile fronds mostly 3-pinnate, usually 2–6(8) sori per pinna.

325. *T. diaphanum*

12(11). Stipes not alate or alate only at the apex; pinnae distant; ala of the rachis 0.1–0.25 mm wide; fertile fronds mostly 2-pinnate-pinnatifid, usually 1(3) sori per pinna and only the basal acroscopic pinna segments fertile.

326. *T. hymenophylloides*

13(3). Laminae not ciliate, the hairs of the costae and stipe bases simple or stellate and coarse..23.

13(3). Laminae ciliate, at least on the midrib and veins..14.

14(13). Cilia stellate or forked at the base. Laminae pinnatifid, acuminate at the base, usually exstipitate, 5–15 cm long, 1.5–2 cm wide.

301. *T. polypodioides*

14(13). Cilia simple..15.

15(14). Cilia with a dark, bulbous base; laminae 2.5–8.5 cm long, 1–1.5 cm wide, pinnate-pinnatifid, truncate at the base, decidedly stipitate.

290. *T. crinitum*

15(14). Cilia without a markedly bulbous, dark base; laminae pinnate or pinnatifid..16.

16(15). Laminae pinnatifid or pinnate, the sterile lobes or pinnae entire or nearly so..18.

16(15). Laminae bipinnatifid or 2-pinnate, the sterile lobes or pinnae crenate, serrate, or more dissected..17.

17(16). Laminae 2-pinnate. Stipes and laminae densely sericeous with reddish hairs; laminae 6–30 cm long, (1.5)3–8 cm wide, pendent; stipes 2–5(8) cm long, not alate.

297. *T. lucens*

17(16). Laminae bipinnatifid, the lobes crenate or serrate. Laminae 3.5–15(25) cm long, 1.5–3 cm wide, slightly narrowed at the base; stipes 1.5–3.5(6) cm long, alate to the base.

293. *T. delicatum*

18(16). Stipes narrowly alate to the base; rachis ala on each side as wide or wider than the rachis. Plants 3–15(25) cm long; laminae lanceate, usually truncate at the base, pinnatifid, the lobes never imbricate.

295. *T. galeottii*

18(16). Stipes not alate or narrowly alate only at the apex; rachis ala on each side narrower than the rachis or absent..19.

19(18). Involucres 1/3–2/3 immersed in the lamina tissue..22.

19(18). Involucres fully to 2/3 immersed in the lamina tissue..20.

20(19). Laminae not much narrowed at the base; proximal pinnae not deflexed or surcurrent. Plants 5–30(40) cm long; involucres 2–4 times longer than wide, tubular, somewhat to greatly flared at the apex, 1–10 per pinna.

291. *T. crispum*

20(19). Laminae decidedly narrowed at the base, and the proximal pinnae deflexed and surcurrent..21.

21(20). Stipes entirely exalate. Plants 40–60 cm long; pinnae nearly acute at the apex.

300a. *T. plumosum*

21(20). Stipes very narrowly alate. Plants 25–45 cm long; pinnae nearly round at the apex.

299a. *T. pellucens*

22(19). Involucres flared at the apex; rhizomes very long-creeping, branched, the fronds scattered; pinnae obtuse or round at the apex, truncate or rarely cordate at the basiscopic base. Plants (15)25–60 cm long.

298. *T. ludovicinum*

22(19). Involucres not flared at the apex; rhizomes erect or ascending, unbranched, the fronds crowded; pinnae acute at the apex, cordate and overlapping the rachis at the basiscopic base. Plants 15–30 cm long.

292. *T. dactylites*

23(13). Fertile and sterile fronds monomorphic..26.

23(13). Fertile and sterile fronds dimorphic, the linear fertile fronds exceeding the sterile ones..24.

24(23). Rachis of fertile fronds broadly alate; involucres immersed in the lamina tissue. Plants 15–30(45) cm long; rachis of sterile fronds occasionally flagelliform and with a terminal, proliferous bud.

294. *T. diversifrons*

24(23). Rachis of fertile fronds not alate; involucres free..25.

25(24). Sterile laminae pectinate; sterile rachis never prolonged or with a terminal, proliferous bud. Plants 7–15(25) cm long.

299. *T. osmundoides*

25(24). Sterile laminae pinnate; sterile rachis often prolonged and with a terminal, proliferous bud. Plants 3–10 cm long.

289. *T. botryoides*

26(23). Laminae pinnate to tripinnatisect, not flagelliform at the apex; false veins absent or parallel to the true veins; plants hemiepiphytic (except *T. kalbreyeri*)..28.

26(23). Laminae pinnate, occasionally flagelliform and with a proliferous bud at the apex; plants not hemiepiphytic..27.

27(26). False veins present at right angles to the true veins. Plants terrestrial; rhizomes erect.

300. *T. pinnatum*

27(26). False veins absent between the true veins. Plants terrestrial; rhizomes erect.

296. *T. hostmannianum*

28(26). Rhizomes erect, thick; laminae coarsely pinnate-pinnatifid; rachis hairs at least partially stellate; plants low trunk epiphytes.

296a. *T. kalbreyeri*

28(26). Rhizomes very long-creeping; laminae pinnate to tripinnatisect; rachis hairs simple; plants hemiepiphytic with the laminae and long-creeping rhizomes appressed to smooth tree trunks..29.

29(28). Pinnae 7–12 mm wide, almost entire to crenate, (6)10–50 pairs per frond.

302. *T. tuerckheimii*

29(28). Pinnae 3–6 mm wide, serrately lobed, 5–25 pairs per frond.

288. *T. ankersii*

30(3). Fronds with paired, pale, marginal, scale-like projections. Plants 2.5–6.5 cm long; stipes obsolete; laminae simple, spatulate to irregularly lobed.

311. *T. membranaceum*

30(3). Fronds without paired, marginal, scale-like projections. Laminae simple to bipinnatifid..31.

31(30). Fronds with blackish, stellate marginal hairs, lacking a submarginal false vein; lips of the involucre usually with blackish margins..34.

31(30). Fronds glabrous on the margin, with or without a submarginal false vein; involucre scarcely with two lips, lacking a dark margin..32.

32(31). False veins between the true veins reticulate, with cross veins; well-developed fertile fronds obovate to nearly orbiculate. Laminae up to ca. 2 cm in diam.

306. *T. godmanii*

32(31). False veins between the true veins linear, without cross veins; well developed fertile fronds oblong or more elongate..33.

33(32). Fronds with a band of marginal cells about as wide as the continuous, submarginal false vein; distal part of fronds irregularly and often deeply lobed.

305. *T. ekmanii*

33(32). Fronds with a band of marginal cells narrower than the discontinuous, submarginal false vein; distal part of fronds only slightly lobed.

309. *T. kapplerianum*

34(31). Venation of sterile fronds distinctly pinnate, with the costae extending to the frond apex..41.

34(31). Venation of sterile fronds flabellate, with the costae absent or not extending beyond the middle of the frond..35.

35(34). Fronds mostly more than 1 cm long, firmly membranaceous, usually with several sori..37.

35(34). Fronds mostly less than 1 cm long, thin and translucent, usually with a single, apical sorus..36.

36(35). Involucre without dark-edged lips; costa absent in sterile fronds.

312. *T. nummularium*

36(35). Involucres with dark-edged lips; costa present at the base of sterile laminae.

313. *T. ovale*

37(35). Marginal hairs stellate; veins usually with no more than 5 rows of cells between them..39.

37(35). Marginal hairs simple or forked at the base; veins usually with at least 12 rows of cells between them..38.

38(37). Laminae usually wider than long, nearly round, cordate to obtuse at the base, entire or slightly crenate distally and at the round apex; cells between the veins elongate parallel to the true veins.

319. *T. rhipidophyllum*

38(37). Laminae usually longer than wide, lanceolate, elliptic, or oblanceolate, obtuse at the base, deeply lobed to bipinnatifid distally (except nearly entire in juveniles); cells between the veins isodiametric.

308. *T. hymenoides*

39(37). Fronds irregularly split along the veins into several irregular segments; sori (5)6 or more per lamina; involucres entirely exerted beyond the lamina tissue.

304. *T. curtii*

398(37). Fronds entire or only slightly split at maturity; sori 4(6) or fewer per lamina; involucres partially immersed in the lamina tissue (except in *T. punctatum* subsp. *labiatum*)..40.

40(39). Lips of the involucres as wide as the tube, rimmed with 1 or 2 rows of darkened cells.

316. *T. punctatum* subsp. *sphenoides*

40(39). Lips of the involucres wider than the tube, rimmed with 2–4 rows of darkened cells.

315. *T. punctatum* subsp. *labiatum*

41(34). Lips of the involucres lacking rows of darkened marginal cells.

314. *T. petersii*

41(34). Lips of the involucres with 1 or more rows of darkened marginal cells (except in juveniles of *T. hymenoides*)..42.

42(41). Fronds pinnatifid, bipinnatifid, or pinnate-pinnatifid with stellate hairs mainly in the sinuses and simple or forked hairs on the margins..44.

42(41). Fronds entire or irregularly lobed distally with stellate hairs throughout and simple or forked hairs absent..43.

43(42). Fronds 0.5–1.5 cm long, 0.1–0.3 cm wide, usually linear to linear-oblong; lips of the involucres with a single row of darkened cells.

303. *T. angustifrons*

43(42). Fronds 1.5–2.5 cm long, 0.4–1.2 cm wide, linear with slight lobes or obovate, irregularly lobed distally; lips of the involucres with several rows of darkened cells.

317. *T. pusillum*

44(42). Lips of the involucres ovate-lanceolate, at least twice as long as wide; laminae densely hairy on the rachis. Laminae usually bipinnatifid or pinnate-pinnatifid, tapered gradually at the base.

307. *T. gourlianum*

44(42). Lips of the involucres subcircular, often wider than long; laminae not densely hairy on the rachis..45.

45(44). False veins submarginal, absent between the true veins; lips of the involucres usually with 2–4 rows of darkened marginal cells.

310. *T. krausii*

45(44). False veins not submarginal, present between the true veins; lips of the involucres usually with 1 row of darkened marginal cells..46.

46(45). Sori 3–8(16) per frond; laminae 2–5.5 cm long; false veins (1)2–3(4) between adjacent true veins.

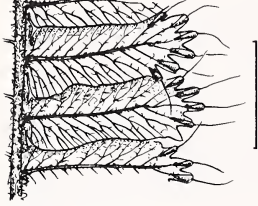
318. *T. reptans*

46(45). Sori 1–3 per frond; laminae 1–3 cm long; false veins 0–1(2) between adjacent true veins.

308. *T. hymenoides*



288 *T. ankersii*



292 *T. dactylites*



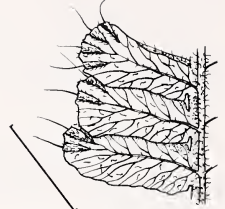
289 *T. botryoides*



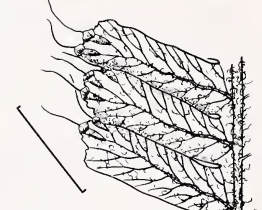
290 *T. crinitum*



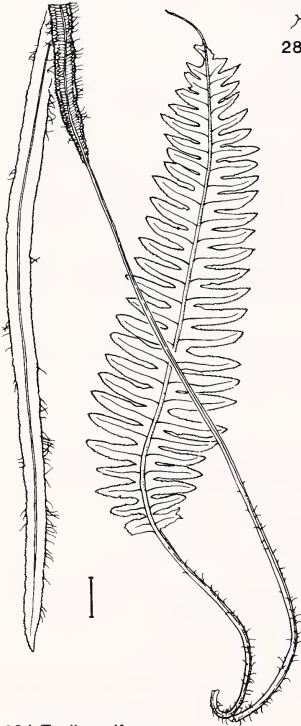
293 *T. delicatum*



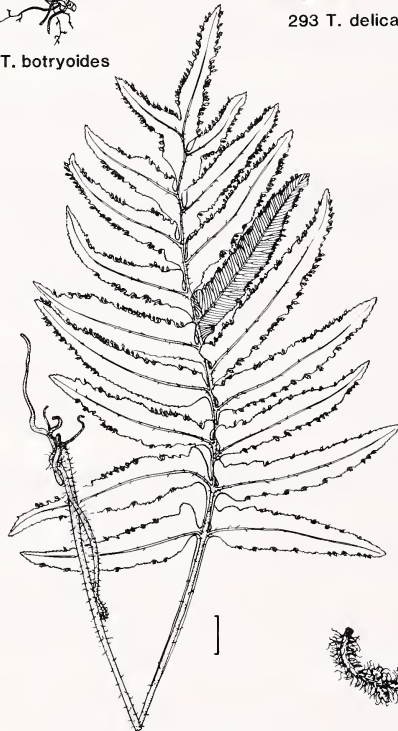
295 *T. galeottii*



291 *T. crispum*



294 *T. diversifrons*



296 *T. hostmannianum*



297 *T. lucens*

TRICHOMANES subg. ACHOMANES K. Presl

288. *Trichomanes ankersii* Parker ex Hook. & Grev. Icon. Fil. 2(11):t. 201. 1831.

Trichomanes commutatum Sturm in Mart. Fl. Bras. 1(2):261. 1859. SYNTYPES: Tanaii, Rio Acará, Est. Pará, Brazil, *Spruce 414* (B not seen); and Mt. Canuku, Guyana, *Rich. Schomburgk 1215 p. p.* (B not seen).

Trichomanes guianense Sturm in Mart. Fl. Bras. 1(2):262. 1859. TYPE: Demerara, Guyana, *Rich. Schomburgk 1215 p. p.* (B not seen).

TYPE: Demerara, Guyana, *Ankers* (K not seen Kramer photo).

Plants epiphytic on trunks, at 0–300 m elevation, in forests, from the Atlantic coastal plain of Costa Rica, the Peninsula de Osa, Sta. Rita ridge (Pcia. Colón), the El Llano–Carti road (Pcia. Panama), the Río Tuquesa (Pcia. Darién), and the Chocó. Also from Nicaragua, Venezuela to Bolivia, Brazil, and the Guianas.

289. *Trichomanes botryoides* Kaulf. Enum. Fil. 263. 1824.

Feea nana Bory, Dict. Class. Hist. Nat. 6:446. 1824; 17:t. 47, f. 1. 1831. TYPE: French Guiana, *Poiteau* (P not seen).

TYPE LOCALITY: Guyana.

Plants epiphytic, at 300–400 m elevation, in the Flora area known only from the trail from Río Blanco del Norte to Caño Sucio, Pcia. Coclé (Knapp 3743, MO, US). Also from Venezuela, Colombia, Guyana, and Surinam.

290. *Trichomanes crinitum* Swartz, Nov. Gen. Sp. Pl. Prodr. 136. 1788.

Trichomanes l'herminieri Fée, Hist. Foug. Antill. [Mém. Foug. 11]:107, t. 29, f. 1. 1866. SYNTYPES: Ste. Rose, St. Luis, and Goyave, Guadeloupe, *L'Herminier* in 1861 (all P or RB none seen).

TYPE: Jamaica, *Swartz* (SBT not seen fragm US photo 6198; isotypes B-Hb. Willd. 20198 not seen Tryon photo, BM not seen photo 6592, S not seen).

Plants epiphytic or occasionally terrestrial on rotting logs, at (700)1000–2400 m elevation, in forests, from north of S. Ramón, the Cordillera Central, the Cordillera de Talamanca above Cartago and above Boquete, near Sta. Fé, Cerro Jefe, between Cerro Jefe and La Eneida (Pcia. Panama), and Cerro Pirre. Also from Cuba, Jamaica, the Lesser Antilles, Venezuela, Colombia, Ecuador, and Peru.

291. *Trichomanes crispum* L. Sp. Pl. 2:1097. 1753.

Trichomanes haenkeanum K. Presl, Hymenophyllaceae 36, 65 (postpr. 128, 157). 1843. TYPE: Based on *T. crispum* sensu K. Presl (Reliq. Haenk. 1:69. 1825), and so based on the type of that name, which is Mountains of Huánuco, Depto. Huánuco, Peru, *Haenke* (PRC not seen).

Trichomanes schomburgkii v. d. Bosch, Nederl. Kruid. Arch. 5(2):148. 1861. TYPE: Berbice, Guyana, *Schomburgk 442* (L not seen; isotypes K not seen photo 19069, US).

Trichomanes crispum var. *remotum* Fée, Hist. Foug. Antill. [Mém. Foug. 11]:106. 1866. TYPE: Guadeloupe, *L'Herminier* [192?] in 1864 (P or RB not seen).

FIGS. 288–297. *Trichomanes*. FIG. 288. Basal portion of pinna of *T. ankersii*, Cuatrecasas 16607. FIG. 289. Plant of *T. botryoides*, Elias 5, Colombia. FIG. 290. Frond of *T. crinitum*, Lent 2088. FIG. 291. Median segments of *T. crispum*, Pittier 4211. FIG. 292. Median pinnae of *T. dactylites*, Cuatrecasas 17381, Colombia. FIG. 293. Plant of *T. delicatum*, Killip & Cuatrecasas 39022, Colombia. FIG. 294. Fertile and sterile fronds of *T. diversifrons*, Maxon 5735. FIG. 295. Median pinnae of *T. galeottii*, Lellinger 1234. FIG. 296. Frond of *T. hostmannianum*, Haught 1335, Colombia. FIG. 297. Frond of *T. lucens*, Valerio III.6.

Trichomanes badium Fourn. Bull. Soc. Bot. France 15:144, 147, 148. 1868. LECTOTYPE: Cuba, Wright 900 (P not seen Weatherby photo; isotypes GH not seen, US), chosen by Proctor (Fl. Jamaica 127. 1985).

Trichomanes lindigii Fourn. Bull. Soc. Bot. France 15:144, 147, 148. 1868. SYNTYPES: Venezuela, Fendler 289 (P not seen) and 389 p. p. (P not seen); and Muzo, Depto. Boyacá, Colombia, 700 m, Lindig 140 (P not seen; isosyntype US).

Trichomanes molle Fourn. Bull. Soc. Bot. France 15:147, 148. 1868. TYPE: Guadeloupe, Est. Bahia, Brazil, Blachet (P not seen).

Trichomanes cristatum var. *macrothrix* Fée, Crypt. Vasc. Brésil 1:186. 1869. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, Glaziou 2246 (P or RB not seen).

Trichomanes imbricatum Sodiro, Anal. Univ. Quito 6(44):70. 1892. TYPE: Near Sto. Domingo de los Colorados, Pcia. Pichincha, Ecuador, 400 m, Sodiro (Hb. Sodiro not seen; isotypes P, GH neither seen).

LECTOTYPE: Plate 86 of Plumier's "Traité...", which is based on a specimen collected by Plumier on Martinique, chosen by Proctor (Fl. Less. Antill. 2:95. 1977).

Plants epiphytic on trunks or rarely terrestrial, at 0–1700 m elevation, in forests, from Monteverde, north of S. Ramón, the Cordillera Central, the Cordillera de Talamanca, the valley of the Río General, Sta. Fé, Pcia. Panama east of the Canal Zone, Cana and Cerro Pirre, and the northern part of the Chocó. Also from the Antilles, Mexico, Guatemala, Nicaragua, Trinidad, Venezuela, Colombia, Peru, Bolivia, Brazil, the Guianas, Uruguay, and Paraguay.

292. *Trichomanes dactylites* Sodiro, Anales Univ. Quito 6(44):70 (repr. 12). 1892.

Trichomanes elatum Desv. Mém. Soc. Linn. Paris 6:327. 1827, non Forst., 1786, nom. illeg. TYPE: "Habitat in America calidiori," collector unknown (P not seen Cintract photo). Synonymized by Weatherby (Contr. Gray Herb. 114:35. 1936).

Trichomanes digitatum Sodiro, Recens. Crypt. Vasc. Quit. 4. 1883, non Swartz, 1806, nom. illeg. TYPE: Near the confluence of the Río Napa with the Río Pilatón, Pcia. Pichincha, Ecuador, 900 m, Sodiro (Hb. Sodiro not seen; presumable isotype US).

TYPE: A renaming of *T. digitatum* Sodiro, and so based on the type of that name.

Plants epiphytic on trunks, at 900–1800 m elevation, in forests, from Cerro Jefe, Cerro Tacarcuna, Alto del Buey, and near the suspension bridge at ca. Km. 141 of the Ciudad Bolívar–Quibdó road (Depto. Chocó). Also from Venezuela, Colombia, and Ecuador.

293. *Trichomanes delicatum* v. d. Bosch, Nederl. Kruid. Arch. 5(2):145. 1861.

Trichomanes daguense Weath. Contr. Gray Herb. 95:36. 1931. TYPE: Dagua Valley, Cordoba, Depto. El Valle, Colombia, 80–100 m, Killip 5251 (US; isotypes GH, NY).

TYPE: Quito, Pcia. Pichincha, Ecuador, Cuming 21 (B not seen fragm L not seen).

Plants epiphytic, usually on tree trunks, at 0–300 m elevation, in forests, from throughout the Chocó. Also from coastal Colombia south of the Chocó.

294. *Trichomanes diversifrons* (Bory) Mett. ex Sadeb. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):108. 1899.

Hymenostachys diversifrons Bory, Dict. Class. Hist. Nat. 8:462. 1825; 17:t. 42, f. 2. 1831. TYPE: French Guiana, Poiteau (P not seen).

Trichomanes elegans Rudge, Pl. Guian. 1:24, t. 35. 1805, non Rich., 1792, nom. illeg. TYPE: French Guiana, *Martin* (BM ex Hb. Rudge not seen; isotype NY not seen).

Feea boryi v. d. Bosch, Nederl. Kruid. Arch. 4:347. 1858, nom. superfl. TYPE: A renaming of *Hymenostachys diversifrons* Bory, and so based on the type of that name.

Trichomanes dimorphum Mett. ex Sadeb. in Engl. & Prantl, Nat. Pflanzenfam. 1(4):108. 1899. TYPE: Not stated.

Plants terrestrial, at 0–300(1000) m elevation, in forests, from the Atlantic and Pacific lowlands of Costa Rica and Panama, and the Chocó. Also from Mexico, Guatemala, Honduras, Belize, Nicaragua, and tropical South America.

295. *Trichomanes galeottii* Fourn. Bull. Soc. Bot. France 15:148. 1868.

Trichomanes killipii Weath. Contr. Gray Herb. 95:36, t. 8. 1931. TYPE: Buenaventura, Depto. El Valle, Colombia, 0–10 m, *Killip 11727* (GH not seen; isotypes NY not seen, US).

LECTOTYPE: Edo. Oaxaca, Mexico, 3000 ft, *Galeottii 6530* (BM not seen; isoelectotypes BR not seen photos 4801 and 19847, K not seen photo 19063, P not seen Weatherby photo), chosen by A. R. Smith (Fl. Chiapas 2:242. 1981).

Plants epiphytic on trunks, at (0)300–1900 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera de Talamanca, the valley of the Río General, the Peninsula de Osa, above Cañazas (Pcia. Veraguas), Cerro Jefe and vicinity, and the mouth of the Río S. Juan. Also from Cuba, Mexico to Honduras, and Nicaragua.

296. *Trichomanes hostmannianum* (Klotzsch) Kunze, Bot. Zeitung (Berlin) 5:352. 1847.

Neurophyllum hostmannianum Klotzsch, Linnaea 18:532. 1845. TYPE: Surinam, *Hostmann 75* (B not seen; isotypes K not seen photos 19086, 19087, NY, U not seen photo 126, US).

Neuromanis abruptum v. d. Bosch, Nederl. Kruid. Arch. 4:350. 1858, nom. superfl. TYPE: A renaming of *Neurophyllum hostmannianum* Klotzsch, and so based on the type of that name. *Neurophyllum abruptum* Fée, which was also cited, is a nomen nudum.

Trichomanes huberi Christ, Bull. Herb. Boissier 6:992. 1898. TYPE: Cununy [Cunaní], Terr. Amapá, Brazil, *Huber 1099* (P not seen Weatherby photo).

Plants terrestrial, at 0–100 m elevation, in forests, in the Flora area known only from the lower Río S. Juan region of the Chocó (*Forero 3943, 4842*, COL, MO, US). Also from Venezuela, Colombia, Peru, Brazil, and the Guianas.

This species resembles the more common *T. pinnatum* but lacks the cross-veins between the main veins that characterize *T. pinnatum*.

296a. *Trichomanes kalbreyeri* Baker, J. Bot. Brit. For. 19:203. 1881.

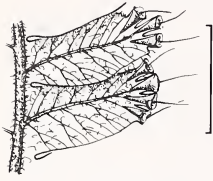
TYPE: Depto. Antioquia, Colombia, 6500 ft, *Kalbreyer 1857* (K not seen; isotype US).

Plants epiphytic, on fallen logs, at 1100–1500 m elevation, in the Flora area known only from the Río S. Rafael, Atlantic slopes of Volcán Barba (*Grayum et al. 7753*, MO not seen, UC), and the Fortuna dam site, Pcia. Chiriquí (*van der Werff & van Hardeveld 67580*, MO not seen, UC). Also from Colombia.

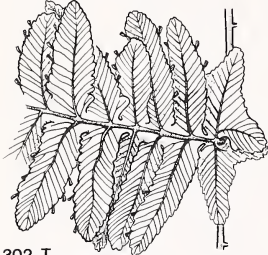
297. *Trichomanes lucens* Swartz, Nov. Gen. Sp. Pl. Prodr. 136. 1788.

Trichomanes lambertianum Hook. Sp. Fil. 1:139, t. 41B. 1846. TYPE: Pillao, Depto. Huánuco, Peru, *Ruiz & Pavon* (OXF not seen; isotype K not seen photo 19075).

Trichomanes splendidum v. d. Bosch, Nederl. Kruid. Arch. 4:360. 1858. SYNTYPES: Bogotá, Distr. Esp., Colombia, *Hartweg 1531* (L not seen); and Peru, *Lechler* (L not seen).



298 *T. ludovicinum*



302 *T. tuerckheimii*



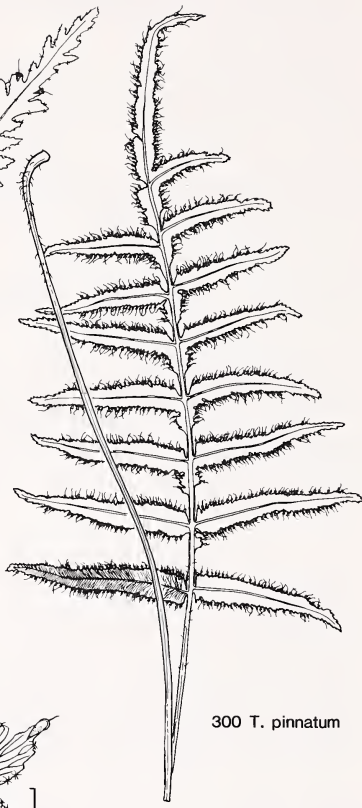
307 *T. gourlianum*



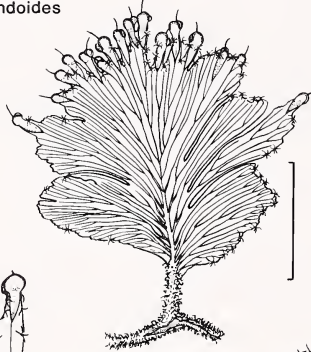
299 *T. osmundoides*



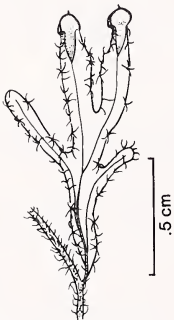
301 *T. polypodioides*



300 *T. pinnatum*



304 *T. curtii*



303 *T. angustifrons*



306 *T. godmanii*



305 *T. ekmanii*

Trichomanes auratum Fée, Crypt. Vasc. Brésil 1:186, t. 67, f. 1. 1869. TYPE: Brazil, *Glaziou* 2465 (P not seen).

TYPE: Jamaica, *Swartz* (SBT not seen; isotypes B-Hb. Willd. 20197 not seen Tryon photo, BM not seen photo 6593S not seen photo 6200, S not seen photo 6200).

Plants epiphytic on trunks, at 1500–2700 m elevation, in forests, from Monteverde, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Jamaica, Venezuela, Colombia to Bolivia, and Brazil.

298. *Trichomanes ludovicinum* Rosenst. Repert. Spec. Nov. Regni Veg. 22:6. 1925.

TYPE: La Palma, Pcia. S. José, *Brade & Brade* 64 (S not seen; isotypes HB not seen, NY, P not seen Weatherby photo, S not seen photo 6201, US).

Plants epiphytic on trunks or terrestrial, at (700)1000–2000 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Moravia (Pcia. Limón), the Río Cacao in the valley of the Río General, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, and Cerro Pajita, north of El Valle.

299. *Trichomanes osmundoides* DC. ex Poir. Encyc. Méth. 8:65. 1808.

Trichomanes spicisorum Desv. Ges. Naturf. Freunde Berlin Mag. 5:329, t. 7, f. 7. 1811. TYPE: French Guiana, *collector unknown* (holotype or isotype FI not seen photo 16577), synonymized by Desvaux (Mém. Soc. Linn. Paris 6:326. 1827).

Feea polypodina Bory, Dict. Class. Hist. Nat. 6:446. 1824; 17:t. 43. 1831. TYPE LOCALITY: Guadeloupe.

Trichomanes spicatum Hook. Sp. Fil. 1:114. 1846. LECTOTYPE: Portland, Jamaica, *Purdie* (K not seen), chosen by Proctor (Ferns Jamaica 8. 1985).

Trichomanes mougeotii v. d. Bosch, Nederl. Kruid. Arch. 4:378. 1858, as “*mougeoti*.” TYPE: French Guiana, *Leprieur* (L not seen; possible isotype US).

Trichomanes platyrachis Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]:45, t. V, f. 1–3. 1929. TYPE: Retreat Plantation, John Crow Hill near Bath, Jamaica, 3500 ft, *N. Wilson* (K not seen; isotype BM).

TYPE: Guyana, *collector unknown* (P-Hb. DC. not seen; probable isotypes B-Hb. Willd. 20192 not seen Tryon photo, FI not seen photo 16578).

Plants terrestrial, at (0)200–700 m elevation, in forests, from the valley of the Río General, the Peninsula de Osa, Santa Rita ridge (Pcia. Colón), Cerro Jefe, Cerro Azul, and near La Eneida (all Pcia. Panama), and the Río Atrato basin. Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles and Trinidad, French Guiana, Venezuela, and Colombia.

299a. *Trichomanes pellucens* Kunze, Linnaea 9:104. 1834.

TYPE: Tocache, upper Río Huallaga, Depto. Huánuco, Peru, Jun 1830, *Poeppig* (LZ destroyed; isotype BR not seen).

FIGS. 298–307. *Trichomanes*. FIG. 298. Median pinna segments of *T. ludovicinum*, Standley & Valerio 49060. FIG. 299. Fertile and sterile fronds of *T. osmundoides*, Lellinger & de la Sota 471. FIG. 300. Frond of *T. pinnatum*, Erlanson 63. FIG. 301. Plant of *T. polypodioides*, Skutch 4596. FIG. 302. Basal portion of pinna of *T. tuerckheimii*, Skutch 3079. FIG. 303. Frond of *T. angustifrons*, Gómez 6565. FIG. 304. Plant of *T. curtii*, Mickel 2790. FIG. 305. Plant of *T. ekmanii*, Wagner 31. FIG. 306. Plant of *T. godmanii*, Maxon 6871. FIG. 307. Frond of *T. gourlianum*, Liesner 1171.

Plants terrestrial or epipetric, rarely epiphytic on low trunks, at 500? and 1300 m elevation, in the Flora area known only from the slopes of Cerro Kikirchabata, Pcia. Limón (Gómez *et al.* 23802, CR not seen, UC) and from the hills near Moravia, Pcia. Limón (L. O. Williams 16185, US). Also from Guatemala, Venezuela and Guyana, Colombia to Bolivia, and Brazil.

300. *Trichomanes pinnatum* Hedw. Fil. Gen. Sp. t. 5, f. 1. 1799.

Trichomanes rhizophyllum Cav. Descr. Pl. 279. 1801. TYPE: Panama, Née (MA not seen), synonymized by Christensen (Dansk Bot. Ark. 9(3):28. 1937).

Trichomanes floribundum Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:505. 1810, nom. superfl. TYPE: A renaming of *T. pinnatum* Hedw., and so based on the type of that name.

Trichomanes longifolium Desv. Ges. Naturf. Freunde Berlin Mag. 5:328. 1811. TYPE: "Habitat in America calidiore," collector unknown (P-Hb. Desv. not seen photo 22053).

Trichomanes pennatum Kaulf. Enum. Fil. 264. 1824. TYPE: French Guiana, collector unknown (LZ destroyed).

Neurophyllum hedwigii v. d. Bosch, Nederl. Kruid. Arch. 4:348. 1858, nom. superfl. TYPE: A renaming of *T. pinnatum* Hedw., and so based on the type of that name.

Neuromanes kaulfussii v. d. Bosch, Nederl. Kruid. Arch. 4:348. 1858, nom. superfl. TYPE: A renaming of *T. pennatum* Kaulf., and so based on the type of that name.

Neuromanes immersum v. d. Bosch, Nederl. Kruid. Arch. 4:349. 1858. TYPE: Sto. Domingo, de Tussac (P or RB not seen; isotype L not seen).

Trichomanes schomburgkianum Sturm in Mart. Fl. Bras. 1(2):249. 1859. SYNTYPES: Near Osembo, Surinam, Kappler 1751 (BR not seen); Berbice, Guyana, Rich. Schomburgk 299 (BR not seen; isosyntype K not seen photo 19088); Essequibo River and the Canuku Mountains, Guyana, Rich. Schomburgk 255 p. p. (BR not seen), 1135 [not 1155 as cited] (BR not seen photo 4818; isosyntypes BM not seen, K not seen).

Neurophyllum hedwigianum Fée, Icon. Esp. Nouv. [Mém. Foug. 10]: Appendix. 1865, nom. superfl. TYPE: A renaming of *Neurophyllum pinnatum* (Hedw.) K. Presl, and so based on the type of *Trichomanes pinnatum* Hedw.

Neurophyllum thecaphyllum Fée, Hist. Foug. Antill. [Mém. Foug. 11]:104, t. 28, f. 1. 1866. TYPE: Sto. Domingo, de Tussac (P or RB not seen).

Trichomanes pinnatum f. *stipitatum* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]:55. 1929. SYNTYPES: Windward Coast, Dominica, J. Jones 1922 (PRC not seen); and near Laudat, Eggers 737 (PRC not seen). Although Domin cited *Neurophyllum hedwigii* in synonymy, this form is not based on that name, which is illegitimate and without nomenclatural standing.

Trichomanes pinnatum var. *kaulfussii* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]:55. 1929. TYPE: Based on *T. pennatum* Kaulf., and not on *Neuromanes kaulfussii* v. d. Bosch, nom. superfl., the other name cited by Domin.

TYPE: "Jamaica," ex *Herb. Banks* (G? not seen); or, if the specimen is not extant, t. 5, fig. 1 of Hedwig's "Filicum Genera et Species" will serve as a lectotype. Proctor in Howard (Fl. Less. Antill. 89. 1977) noted that *T. pinnatum* has not been collected in Jamaica, except supposedly for the type material. It is likely that the type material is from elsewhere in the Antilles.

Plants terrestrial, at 0–700(1200) m elevation, in forests, from near S. Ramón, Sarapiquí (Pcia. Heredia), the valley of the Río General, throughout lowland Panama, and the Chocó. Also from Puerto Rico, the Lesser Antilles, Mexico to Nicaragua, and tropical South America.

This wide-ranging and usually common species is infrequently found in Costa Rica, except for the Peninsula de Osa. It is common in the Chocó and the wetter lowlands of Panama.

300a. *Trichomanes plumosum* Kunze, *Linnaea* 9:104. 1834.

Trichomanes undulatum v.d. Bosch, Nederl. Kruid. Arch. 5(2):147. 1861, non Swartz, 1788, nom. illeg. SYNTYPES: Near Sangari, Peru, *Lechler* 2548 (L not seen; isosyntypes BR not seen photo 4800, K not seen photo 19066); near Tatanara, Peru, *Lechler* 2505 and 2571 (both L neither seen).

TYPE: Pampayacu, Depto. Huánuco, Peru, *Poeppig Diar.* 1107 (LZ destroyed; isotypes BR not seen photo 4819, K not seen photo 19070, U not seen Kramer photo).

Plants probably epiphytic, at 1300–1400 m elevation, in the Flora area known only from Cerro Pirre (*Goldman* 1889, US). Also from Venezuela to Peru.

301. *Trichomanes polypodioides* L. Sp. Pl. 2:1098. 1753.

Trichomanes sinuosum Rich. ex Willd. Sp. Pl. ed. 4, 5:502. 1810. TYPE: Guadeloupe, *comm. Richard* (B-Hb. Willd. 20191 not seen Tryon photo).

Trichomanes quercifolium Desv. Ges. Naturf. Freunde Berlin Mag. 5:328. 1811. SYNTYPES: Cayenne, St. Thomas, Puerto Rico, *collectors unknown* (all P-Hb. Desv. none seen). Synonymized by Weatherby (*Contr. Gray Herb.* 114:35. 1936).

Trichomanes incisum Kaulf. Enum. Fil. 261. 1824, non Thunb., 1800, nom. illeg. TYPE: Brazil, *Chamisso* (B? or LE? not seen).

Trichomanes cognatum K. Presl, Hymenophyllaceae 41 (postpr. 133). 1843. TYPE: Serra de Estrella, Est. Rio de Janeiro, Brazil, *Beyrich* (PRC not seen).

Trichomanes serricula Fée, Crypt. Vasc. Brésil 1:189, t. 68, f. 3. 1869. TYPE: Barra [Manaus], Est. Amazonas, Brazil, *collector unknown* (P or RB not seen).

Trichomanes ujhelyii Kümmerle, Ann. Mus. Nat. Hung. 10:540. 1912. TYPE: Tagua, Sierra S. Lorenzo, Colombia, 2200 m, *Ujhelyi* (BP not seen).

NEOTYPE: Montserrat, *Proctor* 19068 (A not seen; isoneotype US), designated by Proctor (*Fl. Less. Antill.* 2:93. 1977).

Plants epiphytic on trunks, often of tree ferns, at (0)300–1700 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the valley of the Río General, the Peninsula de Osa, the Atlantic coastal plain of Costa Rica and Panama, the Canal Zone, Cerro Campana (Pcia. Panama), the El Llano–Carti-Tupile road (Com. S. Blas), southwestern Pcia. Darién, and the northern Chocó. Also from the Antilles, Trinidad, Mexico to Honduras, and throughout tropical South America.

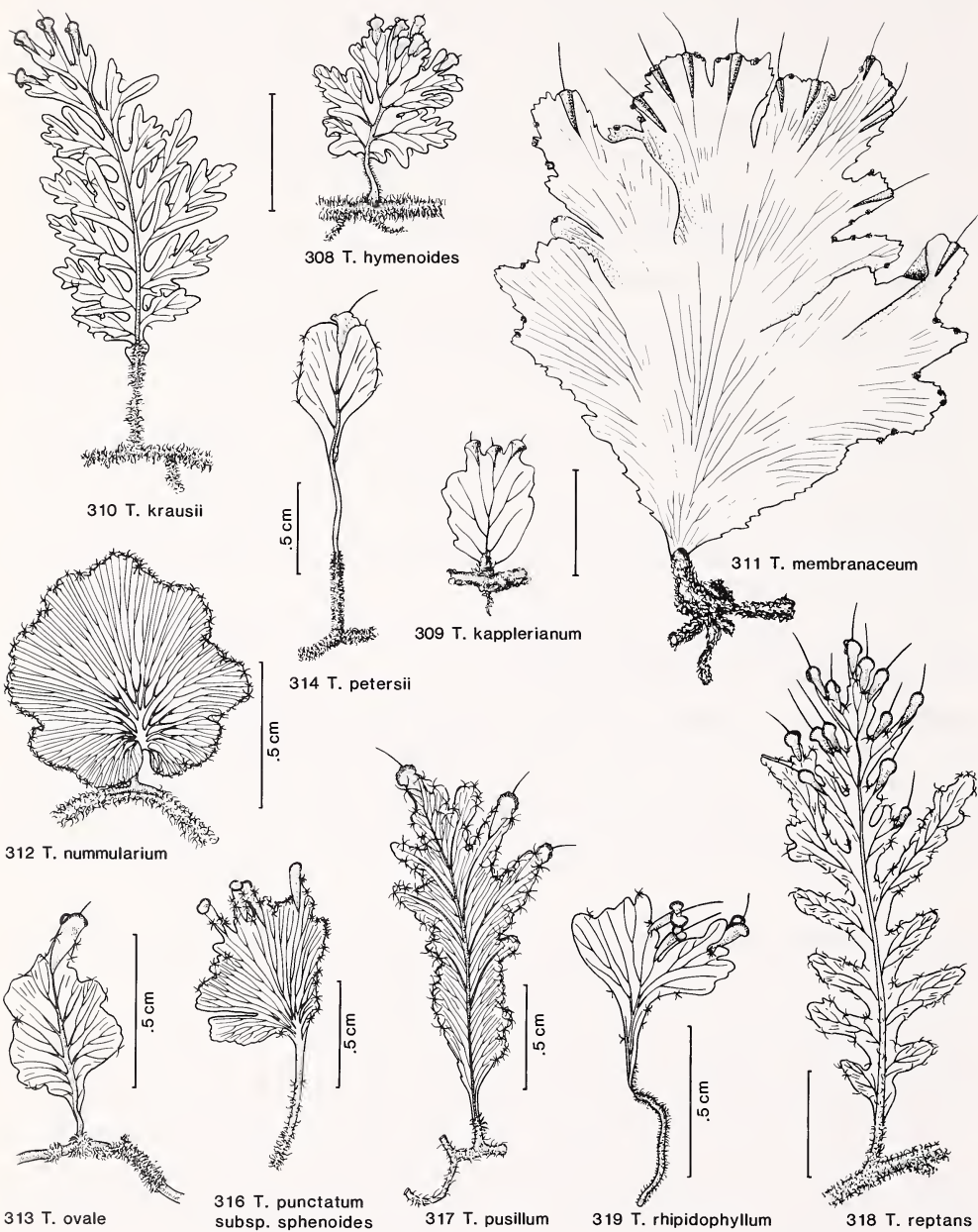
302. *Trichomanes tuerckheimii* Christ, *Hedwigia* 44:361. 1905.

Trichomanes torotumani Vareschi, Acta Bot. Venez. 1:88, t. 3B. 1966. TYPE: Río Torotumani, Terr. Amazonas, Venezuela, *Vareschi & Maegdefrau* 6663 (VEN not seen).

SYNTYPES: Leticia, Depto. Loreto, Peru, *Ule* 6228 (P not seen; isosyntype K not seen Kramer photo); and Cubilquitz, Depto. Alta Verapaz, Guatemala, 350 m, *von Tuerckheim* 8348 (P not seen; isosyntypes K not seen Kramer photo, US).

Plants hemiepiphytic on trunks, at 0–900 m elevation, in forests, from the valley of the Río Reventazón, the valley of the Río General, the Peninsula de Osa and vicinity, Isla de Colón (Pcia. Bocas del Toro), Sta. Rita ridge (Pcia. Colón), the trail from El Llano to Carti-Tupile (Com. S. Blas), and the Río Atrato basin. Also from Mexico, Guatemala, Belize, Colombia to Peru, and Surinam.

This species and the closely related but much rarer *T. ankersii* are hemiepiphytic on smooth-barked tree trunks. The rhizomes and appressed fronds apparently are able to absorb water that flows down the trunk when it rains.



TRICHOMANES subg. DIDYMOGLOSSUM (Desv.) C. Chr.

303. *Trichomanes angustifrons* (Fée) W. Boer in Kramer, Fl. Netherlands Antill. 1(Pterid.):17. 1962.

Didymoglossum angustifrons Fée, Hist. Foug. Antill. [Mém. Foug. 11]:113, t. 28, f. 5. 1866. TYPE: Guadeloupe, *L'Herminier* (P or RB not seen).

Trichomanes setiferum Baker ex Jenm. J. Bot. Brit. For. 19:52. 1881. TYPE: Jamaica, *Jenman 14* (K not seen).

Trichomanes mosenii Lindman, Ark. Bot. 1:46, f. 25D, E, 27. 1903. TYPE: Sorocaba, near Santos, Est. S. Paulo, Brazil, *Mosén 3810* (S not seen; isotype NY).

Plants epiphytic on trunks or epipetric, at 0–200(600) m elevation, in forests, from the Atlantic lowlands of Costa Rica, the lower valley of the Río Reventazón, and the Canal Zone. Also from the Antilles, Trinidad, the Netherlands Antilles, Mexico, Venezuela, Peru, the Guianas, Brazil, and Paraguay.

304. *Trichomanes curtii* Rosenst. Repert. Spec. Nov. Regni Veg. 22:5. 1925.

TYPE: Finca Hundriesser, Pcia. Limón, *Brade & Brade 398a* (*Ros. Fil. Costar. Exs. 222*) (S not seen; isotype UC).

Plants epiphytic on trunks, at 0–300(1100) m elevation, in forests, from the Atlantic lowlands of Costa Rica and Panama, the vicinity of S. Isidro del General, the Peninsula de Osa, the Canal Zone, Sta. Rita ridge (Pcia. Colón), near Cana, and the Chocó. Also from Guatemala, Belize, Nicaragua, and Colombia.

305. *Trichomanes ekmanii* W. Boer, Acta Bot. Neerl. 11:319, f. 33. 1962.

TYPE: La Cumbre, Cordillera Central, Dominican Republic, *Ekman H14342* (U; isotypes F, G not seen, GH, MO, S not seen, UC, US).

Plants epiphytic on trunks and lianas, at 0–200 m elevation, in forests, from Finca La Selva (Pcia. Heredia), the Peninsula de Osa, the Canal Zone, near Cana, and west of Acandí and at Cabo Corrientes (both Depto. Chocó). Also from Cuba, Hispaniola, Belize, Honduras, Venezuela, Colombia, Peru, Bolivia, Surinam, and Brazil.

306. *Trichomanes godmanii* Hook. in Baker, J. Linn. Soc., Bot. 9:337. 1866.

LECTOTYPE: Guatemala, *Salvin & Godman* in 1862 (K not seen fragm US), chosen by W. Boer (Acta Bot. Neerl. 11:319. 1962).

Plants epiphytic on trunks, at 0–200 m elevation, in forests, from the Atlantic coastal plain of Costa Rica, the Peninsula de Osa, and the Canal Zone. Also from Cuba, Mexico to Honduras, and Nicaragua.

307. *Trichomanes gourlianum* Grev. in J. Smith in Seemann, Bot. Voy. Herald 240. 1854.

Trichomanes lehmannii Hieron. Bot. Jahrb. Syst. 34:420. 1904. TYPE: Río Timbiquí, Depto. Cauca, Colombia, *Lehmann 8918* (B not seen; isotype US).

FIGS. 308–319. *Trichomanes*. FIG. 308. Plant of *T. hymenoides*, Lellinger 1107. FIG. 309. Plant of *T. kapplerianum*, Mickel 3462. FIG. 310. Plant of *T. krausii*, Mickel 3510. FIG. 311. Plant of *T. membranaceum*, Mickel 3536. FIG. 312. Plant of *T. nummularium*, Nee 6913. FIG. 313. Plant of *T. ovale*, Standley 55777, Honduras. FIG. 314. Plant of *T. petersii*, Taylor, South Carolina. FIG. 316. Frond of *T. punctatum* subsp. *sphenoides*, Pittier 2375. FIG. 317. Plant of *T. pusillum*, Fendler 24, Venezuela. FIG. 318. Plant of *T. reptans*, Skutch 3268. FIG. 319. Frond of *T. rhipidophyllum*, Cook & Doyle 236.

TYPE: Pcia. Darién, *Gourlie* (not seen). According to W. Boer (*Acta Bot. Neerl.* 11:316. 1962), the type is not present in the Greville Herbarium in Edinburgh.

Plants epiphytic on trunks, at 0–300(1300) m elevation, in forests, from the Peninsula de Osa, the El Llano–Carti road (Pcia. Panama), and the Chocó. Also from other localities in Colombia and from Ecuador.

308. *Trichomanes hymenoides* Hedw. *Fil. Gen. Sp.* t. 6, f. 3. 1799.

Trichomanes muscoides Swartz, *J. Bot.* (Schrader) 1800(2):95. 1801. TYPE: Jamaica, *Swartz* (S not seen; isotype SBT not seen). Morton (*Contr. U. S. Natl. Herb.* 38:77. 1967) considered this species to be a renaming of *T. hymenoides* Hedw., and so based on the type of that name.

Trichomanes apodum Hook. & Grev. *Icon. Fil.* 1:t. 117. 1829. TYPE: Barbados, *Parker* (K not seen).

Trichomanes pabstianum K. Mueller, *Bot. Zeitung* (Berlin) 12:738. 1854. TYPE: Ilha de Sta. Catarina, Est. Sta. Catarina, Brazil, *Pabst* 267 (B not seen; isotype fragm US).

Didymoglossum sociale Fée, *Crypt. Vasc. Brésil* 2:85, t. 85, f. 3. 1873. TYPE: Tijuca, Est. Rio de Janeiro, Brazil, *Glaziou* 5242 [not 5249, as cited] (P or RB not seen; isotype US).

Trichomanes orbiculare Christ, *Bot. Jahrb. Syst.* 19, Beibl. 47: 26. 1894. TYPE: Blumenau, Est. Sta. Catarina, Brazil, *Moeller* (not seen).

Trichomanes fraseri Jenm. *Gard. Chron.* III, 20:266. 1896. TYPE: Grenada, *Fraser* (K not seen).

Trichomanes hymenoides f. *pseudoreptans* Rosenst. *Hedwigia* 46:75. 1906. TYPE: Serra de João Rodriguez, Est. Rio Grande do Sul, Brazil, *Juergens & Stier* 140 (S not seen photo 6152; isotypes NY, UC).

TYPE: Not stated, but according to Morton (*Contr. U. S. Natl. Herb.* 38:77. 1967), presumably Jamaica, *Swartz* (G not seen; isotypes B-Hb. Willd. 20188 not seen Tryon photo, FI not seen photo 16574, L not seen photo 2416). Wessels Boer (*Acta Bot. Neerl.* 11:306. 1962) considered Hedwig's plate to be the type.

Plants epiphytic on trunks and epipetric, at 500–1500(2100) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Cerro Tablazo, Cerro Carpintera, the Fila Costeña near S. Vito, the Cordillera de Talamanca to Pcia. Chiriquí, Cerro Campana (Pcia. Panama), and Cerro Pirre. Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles, Mexico, Guatemala, Belize, Trinidad, Venezuela, Colombia, Peru, Bolivia, Brazil, Paraguay, Uruguay, and Argentina.

309. *Trichomanes kapplerianum* Sturm in Mart. *Fl. Bras.* 1(2):276. 1859.

Didymoglossum cordifolium Fée, *Hist. Foug. Antill.* [Mém. Foug. 11]:113, t. 28, f. 4. 1866. TYPE: Martinique, *Rivoire* (P or RB not seen).

Trichomanes muscoides var. *minor* Jenm. *Bull. Bot. Dept. Jamaica* 20: 8. 1890. TYPE: Not stated. Authentic material may be in the Jenman Herbarium (NY).

Didymoglossum palmarum Vareschi, *Acta Bot. Venez.* 1:86. 1966. TYPE: Near La Fría, Edo. Táchira, Venezuela, *Medina* 1108 (VEN).

TYPE: Surinam River near Station Victoria, Surinam, *Kappler* 1760 (W not seen).

Plants terrestrial on trunks and epipetric, at 0–1500 m elevation, in forests, from Finca Hundriesser (Pcia. Limón), Virgen del Socorro (Pcia. Heredia), behind the Instituto Interamericano de Ciencias Agrícolas near Turrialba (Pcia. Cartago), Barro Colorado Island (Canal Zone), Cerro Gaital Caracoral (Pcia. Coclé), Bahía Solano, and Loma del Cuchillo (Depto. Chocó). Also from Puerto Rico, the Lesser Antilles, Trinidad, Colombia, Peru, the Guianas, and Brazil.

310. *Trichomanes krausii* Hook. & Grev. Icon. Fil. 2:t. 149. 1830.

Didymoglossum fructuosum Fée, Hist. Foug. Antill. [Mém. Foug. 11]:112, t. 28, f. 3. 1866. TYPE: Guadeloupe, *L'Herminier* in 1861 (P or RB not seen).

Trichomanes acrocarpon Fée, Crypt. Vasc. Brésil 1:188, t. 70, f. 1. 1869. TYPE: Rio Grande do Ariro, Est. Rio de Janeiro?, Brazil, *Glaziou* 2248 (RB? not seen; isotype P not seen).

TYPE: Dominica, *Kraus* (E not seen).

Plants epipetric or epiphytic on trunks and branches, at 0–900(1200) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the Atlantic lowlands of Costa Rica and Panama, the valley of the Río General, the Canal Zone, Cerro Campana and Juan Díaz (Pcia. Panama), and the vicinity of Cana. Also throughout tropical America.

311. *Trichomanes membranaceum* L. Sp. Pl. 2:1097. 1753.

TYPE: "America," collector unknown (LINN 1253.1 not seen Maxon photo).

Plants epiphytic or epipetric, at 0–900(1200) m elevation, in forests, from the Cordillera de Tilarán, the Atlantic coastal plain of Costa Rica and Panama, the valley of the Río General, the Peninsula de Osa, near the Fortuna reservoir site (Pcia. Chiriquí), near Sta. Fé, the Canal Zone, around Porto Bello and Sta. Rita ridge (both Pcia. Colón), southeast of Puerto Obaldía (Com. S. Blas), and the northern half of the Chocó. Also from the Antilles, Mexico, Guatemala, Belize, Nicaragua, Trinidad and Tobago, Venezuela, Colombia to Bolivia, and Surinam.

312. *Trichomanes nummularium* (v. d. Bosch) C. Chr. Ind. Fil. 645. 1906.

Didymoglossum nummularium v. d. Bosch, Nederl. Kruid. Arch. 5(3):135. 1863. TYPE: Barra [Manaus], along the Rio Negro, Est. Amazonas, Brazil, *Spruce* (L not seen).

Trichomanes goebelianum Giesenh. Flora 76:179, f. 3A, B. 1892. TYPE: Paraíso, near S. Estebán, Edo. Carabobo, Venezuela, *Goebel* in 1890 (B not seen).

Plants epiphytic, at 0–200 m elevation, in forests, from near Siquirres (Pcia. Limón), near Piedras Blancas (Pcia. Puntarenas), the Peninsula de Osa, Isla de Bastimentos (Pcia. Bocas del Toro), and the Río Masambi Grande near Summit Garden (Canal Zone). Also from Venezuela and Brazil.

313. *Trichomanes ovale* (Fourn.) W. Boer, Acta Bot. Neerl. 11:296. 1962.

Didymoglossum ovale Fourn. Bull. Soc. Bot. France 19:240. 1872. TYPE: Tovar, Edo. Aragua, Venezuela, *Fendler* 25 (P not seen; isotypes B not seen, G not seen, GH not seen, MO).

Trichomanes solitarium Jenm. Gard. Chron. III, 16:592. 1894. TYPE: Ugly River, St. Mary Parish, Jamaica, *Syme* (K not seen; isotype IJ not seen).

Trichomanes fontanum Lindm. Ark. Bot. 1:44, t. 24D, F, 25C, 26. 1903. TYPE: Sto. Angelo, Est. Rio Grande do Sul, Brazil, *Lindman* A1043 (S not seen; isotype US).

Trichomanes sphenoides var. *minor* Rosenst. Hedwigia 46:75. 1906. TYPE: Municipio Rio Pardo, Est. Rio Grande do Sul, Brazil, *Juergens & Stier* 207 (S not seen).

Plants epiphytic or epipetric, at 0–100 m elevation, in forests, from the Peninsula de Osa, Laguna de Chiriquí and vicinity (Pcia. Bocas del Toro), the Canal Zone, and Punta Guayabo Chiquita (Pcia. Darién). Also from the Greater Antilles, Mexico to Honduras, Venezuela, Colombia, Surinam, and Brazil.

314. *Trichomanes petersii* A. Gray, Amer. J. Sci. Arts II, 15:326. 1853.

Trichomanes schaffneri Schlechtend. Linnaea 26:368. 1854. TYPE: Huatusco, Edo. Veracruz, Mexico, *Schaffner* (B not seen).

TYPE: Near the Sipsey River, Winston County, Alabama, 8 Jan 1853, *Peters* (GH not seen; presumable isotype US).

Plants epiphytic, at 1700–1800 m elevation, in the Flora area known only from Cerro Buré, Pcia. Heredia (*Gómez PtC-23867*, CR). Also from the southeastern United States, Mexico, and Guatemala.

315. *Trichomanes punctatum* subsp. *labiatum* (Jenm.) W. Boer, *Acta Bot. Neerl.* 11:302. 1962.

Trichomanes labiatum Jenm. Gard. Chron. II, 24:7. 1885. TYPE: Bartica Grove, Essequibo River, Guyana, *Jenman 2109* (K not seen).

Trichomanes fruticosum Jenm. Gard. Chron. III, 15:71. 1894. TYPE: Kykoverall Island, mouth of the Mazaruni River, Guyana, *Jenman 2351* (K not seen).

Trichomanes myrioneuron Lindm. Ark. Bot. 1:48, t. 25F–I, 28A, B, 29. 1903. TYPE: French Guiana, *Sagot 847 p. p.* (S not seen).

Plants terrestrial on trunks and epipetric, at 0–600 m elevation, in forests, from between Pto. Jiménez and the Río Nuevo (Pcia. Guanacaste), the valley of the Río Reventazón southeast of Turrialba, and Finca La Selva (Pcia. Heredia). Also from Venezuela, the Guianas, and Brazil.

316. *Trichomanes punctatum* subsp. *sphenoides* (Kunze) W. Boer, *Acta Bot. Neerl.* 11:301. 1962.

Trichomanes sphenoides Kunze, *Linnaea* 9:102. 1834. TYPE: Cuchero, near Pampayacu, Depto. Huánuco, Peru, *Poeppig* in 1829 (W not seen; isotype MO).

Plants epiphytic on trunks and epipetric, at 0–500 m elevation, in forests, from Peralta (Pcia. Cartago), the vicinity of Guápiles (Pcia. Limón), Laguna de Chiriquí and vicinity (Pcia. Bocas del Toro), the Canal Zone, Tumba Vieja (Pcia. Colón), S. José Island (Pcia. Panama), between Paya and Pucro (Pcia. Darién), and the region between the Río Atrato and Río S. Juan basins. Also from the Greater Antilles, Guatemala, Honduras, and Venezuela to Bolivia.

317. *Trichomanes pusillum* Swartz, *Nov. Gen. Sp. Pl. Prodr.* 136. 1788.

TYPE: Jamaica, *Swartz* (S not seen; isotypes B not seen Tryon photo, BM not seen photo 6594, SBT not seen).

Plants epiphytic on trunks, at 1000–1500 m elevation, in forests, from north of S. Ramón, above Platanillo (Pcia. Cartago), and between Cartago and S. Isidro del General (Pcia. Cartago or S. José). Also from Jamaica, Hispaniola, Puerto Rico, Venezuela, and Brazil.

318. *Trichomanes reptans* Swartz, *Nov. Gen. Sp. Pl. Prodr.* 136. 1788.

Trichomanes quercifolium Hook. & Grev. Icon. Fil. 1:t. 115. 1829. TYPE: Esmeraldas, Pcia. Esmeraldas, Ecuador, 8000 ft, *Jameson* (E not seen).

Trichomanes montanum Hook. Icon. Pl. 2:t. 187. 1837. TYPE: Near La Sierra on the road to Esmeraldas, Pcia. Esmeraldas, Ecuador, 8500 ft, *Jameson* (K not seen).

Trichomanes pusillum var. *macropus* Christ in Schwacke, Pl. Nov. Mineir. 2:15. 1900. LECTOTYPE: Sta. Rosa du Copey, Pcia. S. José, *Tonduz 12250* (G? not seen; isoelectotypes BR not seen photo 4815, US), inferentially chosen by Christ (Prim. Fl. Costar. 3(1):5. 1901) when he described the variety as new a second time.

TYPE: Jamaica, *Swartz* (S not seen; isotype SBT not seen).

Plants epiphytic on roots and trunks and epipetric, at (100)1000–1800 m elevation, in forests, from S. Pedro de S. Ramón (Pcia. Alajuela), the Cordillera

Central, the Cordillera de Talamanca to Pcia. Chiriquí, above Sta. Fé, Sta. Rita ridge (Pcia. Colón), and Cerro Pirre. Also from Jamaica, Hispaniola, Mexico, Guatemala, Honduras, Nicaragua, Venezuela to Peru, Brazil, and Argentina.

319. *Trichomanes rhipidophyllum* Slosson, Bull. Torrey Bot. Club 40:687, t. 26, f. 1–3. 1913.

TYPE: Near Onaca, Sta. Marta, Depto. Magdalena, Colombia, *H. H. Smith* 2445 (NY; isotype US).

Plants epiphytic on trunks, at 800–1000 m elevation, in forests, from Juan Viñas (Pcia. Cartago) and Villa Colón (Pcia. S. José). Also from Colombia.

TRICHOMANES subg. PACHYCHAETUM K. Presl

320. *Trichomanes elegans* Rich. Actes Soc. Hist. Nat. Paris 1:114. 1792.

Trichomanes millefolium Desv. Mém. Soc. Linn. Paris 6:329. 1827. TYPE: Brazil, collector unknown (P not seen Cintract photo).

Trichomanes prieurii Kunze, Analecta Pteridogr. 48. 1837. SYNTYPES: French Guiana, *Leprieur* (LZ destroyed); Rio Japura, Est. Amazonas, Brazil, *Martius* (M not seen); and Guyana, *Rudge* (K not seen).

Trichomanes lastreoides K. Presl, Hymenophyllaceae 15 (postpr. 107). 1843. TYPE: Brazil, *Sellow* (PRC not seen).

Trichomanes anceps Hook. Sp. Fil. 1:135, t. 40C1. 1846, var. *anceps*. SYNTYPES: Hooker cited several syntypes, including two from the Old World that should not be chosen lectotype.

Trichomanes weddellii v. d. Bosch, Nederl. Kruid. Arch. 5(2):174. 1861. SYNTYPES: Bolivia, *Weddell* (L? not seen); Guyana, *Schomburgk* (K or L? not seen); and Brazil, *Sellow* (B not seen).

Trichomanes opacum v. d. Bosch, Nederl. Kruid. Arch. 5(2):175. 1861. TYPE: S. Gaván, Depto. Puno, Peru, *Lechler* 2175 p. p. (L? not seen).

Trichomanes leprieurii Hook. Gard. Ferns t. 11. 1862, nom. superfl. TYPE: A renaming of *T. prieurii* Kunze, and so based on the type of that name.

TYPE: French Guiana, *Le Blond* (P not seen).

Plants terrestrial, at 0–900(1700) m elevation, in forests, from the Atlantic lowlands and adjacent foothills of Costa Rica and Panama, Cana, and the Chocó. Also from the Lesser Antilles, Nicaragua, and tropical South America.

321. *Trichomanes rigidum* Swartz, Nov. Gen. Sp. Pl. Prodr. 137. 1788.

Trichomanes bifidum Vent. ex Willd. Sp. Pl. ed. 4, 5:511. 1810. TYPE LOCALITY: West Indies.

Trichomanes compressum Desv. Ges. Naturf. Freunde Berlin Mag. 5:329. 1811. TYPE LOCALITY: Hispaniola, according to Weatherby (Contr. Gray Herb. 114:35. 1936).

Trichomanes mandioccanum Raddi, Pl. Bras. Nov. Gen. 1:64, t. 79, f. 2. 1825. TYPE: Serra da Estrella, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Trichomanes firmulum K. Presl, Hymenophyllaceae 46 (postpr. 138). 1843. TYPE: Serra da Estrella, Est. Rio de Janeiro, Brazil, *Beyrich* (PRC not seen; isotype L not seen photo 2455).

Trichomanes daucoides K. Presl, Abh. Königl. Böhm. Ges. Wiss. V, 6:372 (repr. 12), t. 7. 1851. SYNTYPES: Isla de Ometepe, Nicaragua, *Friedrichsthal* (PRC not seen); and Sto. Tomás, Guatemala, *Friedrichsthal* (PRC not seen).

Trichomanes krugii Christ ex Krug in Urban, Bot. Jahrb. Syst. 24:90. 1897. SYNTYPES: Eastern Cuba, *Wright* 903 (K not seen; isosyntype US); Martinique, *Duss* 1531 (not seen); St. Vincent, *Smith* 485 (K not seen); Grenada, *Eggers* 6145b, 6175b (neither seen); and Grenada, *Sherring* 129 (K not seen; isosyntype US).

TYPE: Jamaica, *Swartz* (S not seen photo 6184; isotype B-Hb. Willd. 20202-1 not seen Tryon photo).



322 *T. sprucei*



320 *T. elegans*



325 *T. diaphanum*



326 *T. hymenophylloides*



321 *T. rigidum*



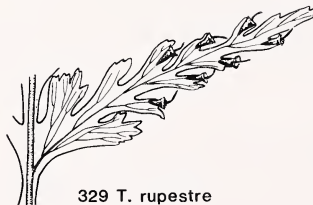
324 *T. collariatum*



323 *T. capillaceum*



328 *T. radicans*



329 *T. rupestre*



327 *T. pyxidiferum*

Plants terrestrial, at 500–1700(2500) m elevation, in forests, from Los Angeles de S. Ramón (Pcia. Alajuela), Volcán Poás, the Cordillera de Talamanca to Pcia. Chiriquí and its foothills, the mountains of Panama, and the Serranía de Baudó. Also from the Antilles, Trinidad, Mexico to Nicaragua, and tropical South America.

322. *Trichomanes sprucei* Baker, Syn. Fil. 87. 1867.

Trichomanes subdeltoideum C. Chr. Ind. Fil. 650. 1906, nom. superfl. TYPE: A renaming of *T. sprucei* Baker, non *T. spruceanum* Hook., 1854, and so based on the type of *T. sprucei*.

SYNTYPES: Brazil, *Spruce 1399* (K not seen); and Panuré, Est. Amazonas, Brazil, *Spruce 2838* (K not seen; isosyntype US).

Plants terrestrial, at 0–100 m elevation, in forests, in the Flora area known only from Los Pedregales, below Cerro Tife, Pcia. Coclé, 500 m (*Knapp & Dressler 3795*, MO) and from La Concepción, 15 km east of Quibdó (*Archer 2000*, US). Also from other localities in Colombia, Venezuela, Peru, and Brazil.

TRICHOMANES subg. TRICHOMANES

322a. *Trichomanes angustatum* Carm. Trans. Linn. Soc. London 12:513. 1818.

Trichomanes tenerum Spreng. Syst. Veg. ed. 16, 4:129. 1827. TYPE: Brazil, collector unknown (LZ destroyed).

Trichomanes fulvum Klotzsch in Sturm in Mart. Fl. Bras. 1(2):272, t. 18, f. 6. 1859. TYPE: Brazil, Sello (W not seen; isotype K not seen photo 19095).

TYPE: Tristan da Cunha, *Cunningham* (K not seen; isotype BM not seen).

Plants epiphytic, at ca. 2000 m elevation, in forests, in the Flora area known only from the southern slope of Volcán Barba, Pcia. Heredia (*Montgomery & Huttleston 85-94*, US). Also from Cuba, Jamaica, Hispaniola, Mexico to Honduras, and Colombia to Argentina and Brazil.

323. *Trichomanes capillaceum* L. Sp. Pl. 2:1099. 1753.

Trichomanes tenellum Hedw. Fil. Gen. Sp. ad t. 6, f. 1. 1799. TYPE: Jamaica, Swartz (LZ destroyed?; isotype FI not seen photo 16562).

Trichomanes trichodeum Swartz, J. Bot. (Schrader) 1800(2):98. 1801, nom. superfl. TYPE: A renaming of *T. tenellum* Hedw., and so based on the type of that name. Swartz cited *T. pusillum* in publishing *T. trichodeum*, but when later (Syn. Fil. 144. 1806) he renamed *T. trichodeum* as *T. trichodes*, he did cite *T. tenellum*.

Trichomanes angustissimum K. Presl, Abh. Königl. Böhm. Ges. Wiss. V, 6:378 (repr. 18), t. 8A. 1851. SYNTYPES: Jamaica, Swartz (B-Hb. Willd. 20200 not seen microfiche S. I. Library); and Colonia Tovar, Edo. Aragua, Venezuela, *Moritz 151* (PRC? not seen).

Trichomanes schiedeanaum K. Muell. Bot. Zeitung (Berlin) 12(41):716. 1854. TYPE: Mexico, *Schiede* (B not seen).

Trichomanes capillaceum var. *subclavatum* Christ in Pitt. Prim. Fl. Costaric. 3(1):4. 1901. TYPE: Tuis, Pcia. Cartago, 650 m, *Tonduz 11308* (P not seen; isotypes CR, US).

FIGS. 320–329. *Trichomanes*. FIG. 320. Median pinna of *T. elegans*, Cuatrecasas 16547. FIG. 321. Median pinna of *T. rigidum*, Williams 907. FIG. 322. Median pinna of *T. sprucei*, Lellinger & de la Sota 463. FIG. 323. Median pinna of *T. capillaceum*, Jiménez M. 1458. FIG. 324. Distal median pinna of *T. collariatum*, Wilbur & Stone 9735. FIG. 325. Median pinna of *T. diaphanum*, Killip 5210. FIG. 326. Median pinna of *T. hymenophylloides*, Lellinger 784. FIG. 327. Median pinna of *T. pyxidiferum*, Skutch 2315. FIG. 328. Median pinna of *T. radicans*, Lellinger 1101. FIG. 329. Median pinnule of *T. rupestre*, Skutch 2529.

Trichomanes hypnoides Christ, Bull. Herb. Boissier II, 5:725. 1905. TYPE: Zonehuitz, Edo. Chiapas, Mexico, *Muench 108* (P? not seen; isotypes DS, US).

TYPE: Plate 99D of Plumier's "Traité...", which is based on a specimen collected by Plumier on Hispaniola.

Plants epiphytic, often on tree fern trunks, at 600–2000(2700) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and Cerro Tacarcuna. Also from the Greater Antilles, Mexico to Nicaragua, and Venezuela to Peru.

The laminae of *T. capillaceum* var. *subclavatum* are not so completely skeletonized as are those in the more extreme forms of this species, but the variation seems continuous and taxonomically inconsequential.

324. *Trichomanes collariatum* v. d. Bosch, Nederl. Kruid. Arch. 4:368. 1859.

Trichomanes repens Schott ex Sturm in Mart. Fl. Bras. 1(2):264. 1859. TYPE: Locality unknown, Herb. Mus. Pal. Vindob. 4480 (W not seen photo BM not seen), synonymized by A. R. Smith (Fl. Chiapas 2:241. 1981).

Trichomanes repens var. *stipitatum* Sturm in Mart. Fl. Bras. 1(2):264. 1859. TYPE: Near S. Gabriel, Rio Negro, Est. Amazonas, Brazil, *Spruce 2181* (W not seen; isotypes K not seen photo 19049, UC, US).

Trichomanes martinezii Rovirosa, Pteridogr. Sur México 106, t. 74A, f. 1–3. 1910. TYPE: Río Lacanjá, Edo. Chiapas, Mexico, *L. Martinez* (Hb. Rovirosa 1103 not seen).

TYPE: Teapa, Edo. Tabasco, Mexico, 300 ft, *Linden 1508* (L not seen; isotypes GH not seen, K not seen photo 19047).

Plants epiphytic on trunks, at 0–1500(2000) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the valley of the Río Reventazón, the Atlantic coastal plain of Costa Rica and adjacent Panama, near the Fortuna Reservoir (Pcia. Chiriquí), near Sta. Fé, the Canal Zone and adjacent Panama, southeast of Puerto Obaldía (Com. S. Blas), the Cana–Cuasi trail (Pcia. Darién), and the slopes of Alto del Buey. Also from Mexico to Honduras, Nicaragua, and Venezuela and Colombia to Peru and Brazil.

325. *Trichomanes diaphanum* H.B.K. Nov. Gen. Sp. 1:25 (fol. 16). 1816.

Trichomanes eximium Kunze ex Sturm in Mart. Fl. Bras. 1(2):271. 1859, nom. superfl. TYPE: A renaming of *T. diaphanum* H.B.K., which was cited in synonymy, and so based on the type of that name.

Trichomanes debile v. d. Bosch, Nederl. Kruid. Arch. 5(2):154. 1861. TYPE: Carabobo, Edo. Carabobo, Venezuela, *Funck & Schlim 596* (L? not seen).

Trichomanes bradei Christ, Bull. Soc. Bot. Genève II, 1:217. 1909. TYPE: La Palma, Pcia. S. José, 1400 m, 14 Mar 1908, *Brade* (P? not seen).

Trichomanes diaphanum var. *subalatum* Rosenst. Repert. Spec. Nov. Regni Veg. 7:291. 1909, as "subalata." TYPE: Mt. Pichincha, Pcia. Pichincha, Ecuador, *Spruce 5654* (S not seen).

Trichomanes eximium var. *crispulum* Rosenst. Repert. Spec. Nov. Regni Veg. 20:89. 1924. LECTOTYPE: Organ Mountains, Est. Rio de Janeiro, Brazil, *Luetzelburg 6196* (M not seen; isoelectotype US), chosen by Lellinger (Mem. New York Bot. Gard. 38:27. 1984).

TYPE: Venezuela, *Humboldt & Bonpland* (B not seen).

Plants epiphytic on trunks and branches, at (0)500–2300(2700) m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the Peninsula de Osa, the vicinity of Laguna de Chiriquí (Pcia. Chiriquí), Cerro Gaital Caracoral and La Mesa (Pcia. Coclé), near Alto Piedra near Sta. Fé,

Cerro Jefe, and Loma del Cuchillo (Depto. Chocó). Also from Guatemala, Honduras to Nicaragua, Venezuela to Guyana, and Colombia to Peru and Brazil.

326. *Trichomanes hymenophylloides* v. d. Bosch, Nederl. Kruid. Arch. 5(3):209. 1863.

Trichomanes pyxidiferum Hook. & Grev. Icon. Fil. 2:t. 206. 1831, non L., 1753, nom. illeg. TYPE: Based on St. Vincent, Guilding [194] (K not seen; isotype GH not seen; presumable isotype L not seen photo 2451).

Trichomanes leptophyllum v. d. Bosch, Nederl. Kruid. Arch. 4:363. 1859, non A. Cunn. in Hook., 1836, nom. illeg. TYPE: Based on *T. pyxidiferum* Hook. & Grev., and so based on the type of that name.

TYPE: A renaming of *T. leptophyllum* v. d. Bosch, and so based on the type of that name.

Plants epiphytic on trunks and branches, at 1400–2000 m elevation, in forests, from Monteverde, Porrosatí (Pcia. Heredia), Sta. Clara de Cartago (Pcia. Cartago), and above Boquete. Also from the Antilles, Mexico, Guatemala, Honduras, Trinidad, Venezuela to Ecuador, Guyana, Surinam, and Brazil.

327. *Trichomanes pyxidiferum* L. Sp. Pl. 2:1098. 1753.

Trichomanes brasiliense Desv. Mém. Soc. Linn. Paris 6:328, t. VII, f. 4. 1827. TYPE: Brazil, collector unknown (P not seen).

Trichomanes olivaceum Kunze ex Klotzsch, Linnaea 20:437. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, Moritz 341 (B not seen; isotype BR not seen photo 4808).

Trichomanes emarginatum K. Presl, Gefässbündel Farrn 24 (postpr. 332). 1847, non Poir., 1808, nom. illeg. SYNTYPES: Serra da Estrella, Est. Rio de Janeiro, Brazil, Beyrich (PRC not seen; isotype L not seen photo 2449), and Pohl (PRC not seen).

Trichomanes cavifolium K. Muell. Bot. Zeitung (Berlin) 12(43):753. 1854. TYPE: Based on *T. pyxidiferum* sensu Schlechtend. & Cham. (Linnaea 5:618. 1830), hence on the basis of that name, which is the specimen Cuesta grande de Chiconquiaco, Mexico, Schiede (B not seen).

Trichomanes lechleri v. d. Bosch, Nederl. Kruid. Arch. 4:363. 1859. TYPE: Based on *T. pyxidiferum* sensu Kunze (Linnaea 9:106. 1834), hence on the basis of that name, which is the specimen Near Pampayacu, Depto. Huánuco, Peru, Poeppig 1105 (LZ destroyed).

Trichomanes tenellum Mart. ex v. d. Bosch, Nederl. Kruid. Arch. 5(2):154. 1861, non Hedw., 1799, nom. illeg. TYPE: Brazil, Martius 146 (L not seen photo 2452).

Trichomanes tranninense Fée, Crypt. Vasc. Brésil 1:187, t. 69, f. 1. 1869. TYPE: Brazil, Glaziou 2251 (P or RB not seen).

Trichomanes junceum Christ, Bull. Herb. Boissier II, 4:944. 1904. TYPE: Costa Rica, Wercklé (P not seen; isotype US fragm NY).

Trichomanes pyxidiferum var. *organense* Rosenst. Repert. Spec. Nov. Regni Veg. 20:89. 1924. SYNTYPES: Serra dos Orgãos, Est. Rio de Janeiro, Brazil, Luetzelburg 93 (M not seen); and Itamaraty, Serra dos Orgãos, Est. Rio de Janeiro, Brazil, Luetzelburg 92 (M not seen photo 6204; isosyntype NY).

Trichomanes pyxidiferum f. *gracile* Rosenst. Repert. Spec. Nov. Regni Veg. 20:90. 1924. TYPE: Corcovado, Est. Rio de Janeiro, Brazil, Luetzelburg 262 (M not seen; isotype NY).

TYPE: Plate 50E of Plumier's "Traité...", which was based on a plant collected by Plumier on Hispaniola.

Plants epiphytic on tree trunks and branches, rarely epipetric, at 400–1300(1800) m elevation, in forests, from near S. Ramón, the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, the valley of the Río General, and the Fila Costeña near S. Vito. Also from the

Greater Antilles, Mexico to Nicaragua, and Venezuela and Colombia to Guyana and Brazil.

328. *Trichomanes radicans* Swartz, J. Bot. (Schrader) 1800(2):97. 1801, var. *radicans*.

Trichomanes kunzeanum Hook. Sp. Fil. 1:127, t. 39D. 1844. SYNTYPES: Near Pampayacu, Depto. Huánuco, Peru, *Poeppig* 1132 (K not seen photo 19050; isotype LZ destroyed); Pangoa, Depto. Junín, Peru, *Mathews* 1088 (K not seen photo 19051); and Truxillo and Mérida, Edo. Mérida, Venezuela, *Linden* 176 (K not seen; isosyntypes BR not seen, FI not seen photo 16586).

Trichomanes mexicanum v. d. Bosch, Nederl. Kruid. Arch. 5(2):164. 1861. SYNTYPES: Mexico, *Schiede* 806 (B not seen fragm L not seen); and Mexico, *Schaffner* 7 (P or RB not seen fragm L; probable isosyntype K not seen photo 19052).

Trichomanes latevirens Fée, Crypt. Vasc. Brésil 1:191, t. 67, f. 2. 1869. TYPE: Brazil, *Glaziou* 1677 (P or RB not seen).

TYPE: Jamaica, *Swartz* (S not seen photo 6205).

Plants epiphytic on trunks, at (100)400–2800(3200) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, Cerro Campana (Pcia. Panama), and Cana. Also throughout tropical America.

Proctor (Amer. Fern J. 72:108. 1982) distinguished specimens with more skeletonized fronds and larger, broadly winged involucres growing on calcareous rocks in Jamaica as *T. radicans* var. *antillarum* (v. d. Bosch) Proctor.

329. *Trichomanes rupestre* (Raddi) v. d. Bosch, Nederl. Kruid. Arch. 4:370. 1859.

Hymenophyllum rupestre Raddi, Pl. Bras. Nov. Gen. 1:67, t. 80. 1825. SYNTYPES: Gavia, Tijuca, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen); and Corcovado, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Trichomanes venustum Desv. Mém. Soc. Linn. Paris 6:328. 1827. TYPE: Brazil, *collector unknown* (P not seen).

Trichomanes luschnathianum K. Presl, Hymenophyllaceae 45 (postpr. 137). 1843. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Luschnath* (PRC not seen).

Trichomanes pellucidum Goldm. in Meyen, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19, Abh. 1:466. 1843. TYPE: Corcovado, Est. Rio de Janeiro, Brazil, *Martius?* (not seen).

Trichomanes frondosum Fée, Crypt. Vasc. Brésil 1:190, t. 68, f. 1, 2. 1869. SYNTYPES: Brazil, *Glaziou* 917 (P or RB not seen), 1647 (P or RB not seen), 1715 (P or RB not seen; isosyntype K not seen photo 19054), and 2254 (P or RB not seen).

Trichomanes venustum var. *monomorphum* Christ, Bull. Herb. Boissier II, 4:944. 1904. TYPE: Costa Rica, *Wercklé* (P not seen).

Plants epiphytic on trunks, at 100–1600 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the valley of the Río General, and the Fila Costeña near S. Vito. Also from Venezuela, Colombia, Peru, Bolivia, and Brazil.

This species is rather variable; the more dissected forms resemble *T. collariatum* or *T. radicans*, but the pinnae are more inequilateral in *T. rupestre*.

GLEICHENIACEAE

Rhizomes very long-creeping, dichotomously branched, mostly dark brown, bearing pluricellular, lax or bristle-like hairs, narrow, mostly brownish, often ciliate or setose scales, or both; fronds medium-sized to large, commonly scrambling over other vegetation; stipes distant along the rhizomes, wiry; laminae pinnately or usually pseudodichotomously divided, with at least the ultimate segments pectinate, occasionally scaly, the pseudodichotomies bearing a hairy or scaly bud, this sometimes breaking dormancy and producing a prolonged axis bearing a pair of segments and a resting bud at its apex; penultimate and more proximal axes naked, partially pectinate, or pectinate; laminae glabrous, glaucous, or hairy abaxially; veins always free, simple or 1–3-forked; sori round, surficial on the abaxial surface of the laminae; indusia absent; sporangia a small (2–ca. 15) and often constant number per sorus, short-stalked, pear-shaped; paraphyses absent; spores more than 100 per sporangium, monolete or trilete.

1. Veins in the ultimate segments simple or 1-forked; sporangia usually 2–ca. 5 per sorus; rhizomes and resting buds scaly.

44. *Gleichenia*

1. Veins in the ultimate segments 2- or 3-forked; sporangia usually 8–15 per sorus; rhizomes and resting buds hairy.

45. *Dicranopteris*

44. GLEICHENIA J. E. Smith

Plants terrestrial, often in disturbed places like roadbanks and landslides; rhizomes long-creeping, thin, occasionally forked, scaly, the scales lanceate or lanceolate, commonly weakly bicolorous, pale to dark brown, ciliate to setose; fronds mostly large, often sprawling over other vegetation; stipes long, terete or nearly so, rigid, often glabrous; laminae deltate to oblong, the rachis bearing distant, opposite pairs of pinnae flanking a terminal bud that elongates to continue the rachis or remains dormant at the frond apex, the bud and pinna bases variously scaly; pinnae mostly 1–3 times pseudodichotomously divided (pinnate in *G. bancroftii*) with a dormant bud at each division, at least the ultimate divisions laminate, these laminae pectinate, linear to elliptic, glabrous adaxially, often hairy or glaucous abaxially and with scales on the axes, mostly subcoriaceous or coriaceous, often somewhat revolute at the margins; veins 1-forked; sori round, exindusiate, composed of a rather constant, low (ca. 2–5) number of subsessile sporangia, paraphyses absent.

Pantropical and subtropical, with a few species in temperate regions of the Southern Hemisphere; ca. 130 species, including *Diplopterygium* and *Sticherus*.

MAXON, W. R. 1909. Gleicheniaceae. North Amer. Fl. 16(1):53–63.

1. Primary branches bipinnate, not dichotomously forked. Plants large, with 1(3) pair(s) of pinnae up to 1.5 m long, 50 cm wide.

330. *G. bancroftii*

1. Primary branches once to several times pseudodichotomously forked, not pinnately divided..2.

2(1). Bud scales linear-lanceolate to narrowly triangular, usually ciliate, whitish or pale reddish brown to dark brown, indurate; laminae and axes usually scaly or pubescent..7.

2(1). Bud scales broadly triangular to roundish, usually eciliate, pale to dark brown, not indurate; laminae and axes glabrous (except in *G. pteridella*)..3.

3(2). Laminae and axes with broad, ciliate scales; primary branches (1)2(3)-forked; central frond axes sometimes prolonged. Primary and secondary branches not pectinate.

342. *G. pteridella*

3(2). Laminae and axes glabrous; primary branches 1(2)-forked; central frond axes not prolonged..4.

4(3). Segments strongly reflexed, mostly ca. 8 mm distant. Plants up to 50 cm long; primary branches not pectinate.

344. *G. retroflexa*

4(3). Segments not reflexed..5.

5(4). Axes slightly flexuous, especially toward the apex of the pinnae. Plants up to ca. 1 m long; central frond axes and pinna axes prolonged; primary branches pectinate; base of segments fully adnate to the rachis, more surcurrent than decurrent.

340. *G. orthoclada*

5(4). Axes not flexuous..6.

6(5). All branches pectinate; segments approximate, fully adnate to the axis. Plants up to 2 m long; central frond axes and pinna axes prolonged.

337. *G. intermedia*

6(5). Primary branches not pectinate; segments somewhat distant, the base hastulate, the acroscopic base free and overlapping the axis. Plants probably less than 1 m long; central frond axes prolonged.

336. *G. hastulata*

7(2). Branches with their segments up to 3.5 mm across, at a 30° angle to one another, 3(5) times equally pseudodichotomously forked.

335. *G. gnidioides*

7(2). Branches with their segments more than 8 mm across..8.

8(7). Bud scales broadly to narrowly lanceolate, with long, lax, twisted, marginal cilia..14.

8(7). Bud scales narrowly lanceolate to linear, with short, stiff, straight, marginal cilia (cilia absent in *G. nitidula*)..9.

9(8). Laminae densely tomentose on the abaxial surface, sometimes glabrescent. Rachises with deciduous, atropurpureous, shiny, lanceolate scales.

332. *G. brevipubis*

9(8). Laminae glabrous or scaly on the abaxial surface, not tomentose..10.

10(9). Branches with their segments 1–2.5(3.5) cm wide..12.

10(9). Branches with their segments (3)4–9 cm wide..11.

11(10). Margins and abaxial surface of the laminae with stellate scales and stellate hairs. Plants large; central frond axes prolonged; primary branches not pectinate; segments (1.5)2–3 cm long, usually less than their width distant.

333. *G. compacta*

11(10). Margins and abaxial surface of the laminae with lanceolate, deeply toothed or ciliate scales. Plants large; central frond axes prolonged; primary branches not pectinate; segments 2–4 cm long, more than their width distant.

343. *G. remota*

12(10). Laminae glabrous on the pinna axes. Plants ca. 0.5 m long; central frond axes elongate in the largest specimens; primary rachises partially or not pectinate, rarely fully so; ultimate branches with their segments ca. 10 mm wide, glaucous abaxially.

339. *G. nitidula*

12(10). Laminae scaly on the pinna axes..13.

13(12). Veins 18–26 pairs per segment; segments linear, round at the apex; branches with their segments (10)15–35 mm wide.

345. *G. rubiginosa*

13(12). Veins 9–15 pairs per segment; segments lanceate, obtuse to acute at the apex; branches with their segments 10–25 mm wide. Plants 30(45) cm long.

346. *G. strictissima*

14(8). Scales of the buds and axes whitish or stramineous, sometimes with a reddish-brown, indurate central area. Laminae glaucous on the abaxial surface; segment axes glabrous; primary branches not pectinate; central frond axes not prolonged.

341. *G. pallescens*

14(8). Scales of the buds and axes reddish-brown, sometimes with a slightly darker, but not indurate central area..15.

15(14). Laminae not tomentose on the abaxial surface..17.

15(14). Laminae densely tomentose on the abaxial surface, sometimes glabrescent..16.

16(15). Segments 1.5–2.5 mm wide, 10–18 mm long. Plants 0.5–2 m long.

331. *G. bifida*

16(15). Segments ca. 2.5 mm wide, 6 mm long. Plants ca. 0.5 m long.

338. *G. maritima*

17(15). Branches with their segments 1–2 cm wide; segments strongly revolute, coriaceous, the veins obvious on the adaxial surface. Primary branches partially pectinate; central frond axes repeatedly prolonged.

334. *G. costaricensis*

17(15). Branches with their segments (1)1.5–3 cm wide; segments slightly revolute, chartaceous, the veins almost hidden on the adaxial surface. Primary branches not or partially pectinate, or with accessory pinnae; central frond axes repeatedly prolonged.

333. *G. compacta*

330. *Gleichenia bancroftii* Hook. Sp. Fil. 1:5, t. 4A. 1844.

Mertensia bancroftii var. *vitellina* Kunze, Linnaea 18:307. 1845. TYPE: Caracas, Distr. Fed., Venezuela, *Moritz 11* (LZ destroyed; isotype B not seen).

Mertensia grandis Fée, Hist. Foug. Antill. [Mém. Foug. 11]:120. 1866. SYNTYPES: Matouba, Guadeloupe, *L'Herminier* in 1861 (P not seen; isosyntypes IJ not seen, US); and Huatusco, Mirador, Edo. Veracruz, Mexico, *Schaffner 230* (RB not seen).

Gleichenia bancroftii var. *gracilis* Jenm. Bull. Bot. Dept. Jamaica 5:276. 1898. TYPE: Jamaica, 1500–1800 m, *Jenman* (NY? not seen).

Gleichenia brunei Christ, Bull. Herb. Boissier II, 5:13. 1905. TYPE: El Desengaño, Pcia. Heredia?, 1400 m, *Brune 317* (P not seen).

LECTOTYPE: Jamaica, *Bancroft* (K not seen), chosen by Proctor (Fl. Less. Antill. 60. 1977).

Plants terrestrial, at ca. 1800 m elevation, in the Flora area known only from the type of *G. brunei*, one unlocalized collection from Costa Rica (*Wercklé* in 1907, US), and Vara Blanca, Pcia. Heredia (*Chrysler 4986*, MO, US). Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles, Mexico to El Salvador, and Venezuela and Colombia to Bolivia.

331. *Gleichenia bifida* (Willd.) Spreng. Syst. Veg. ed. 16, 4:27. 1827.

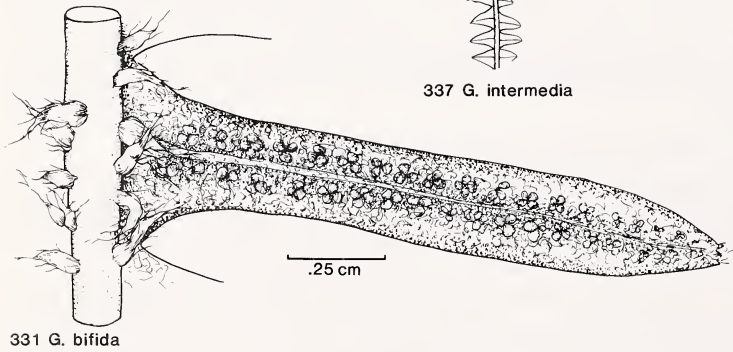
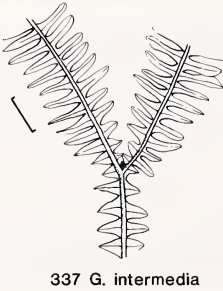
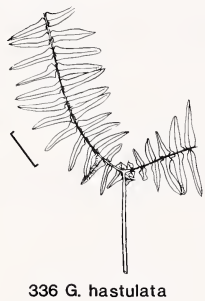
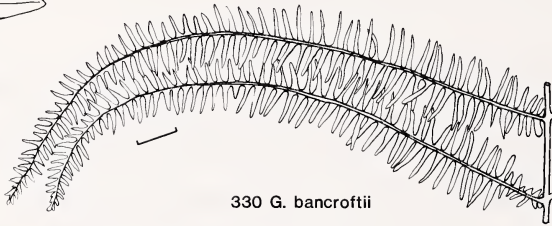
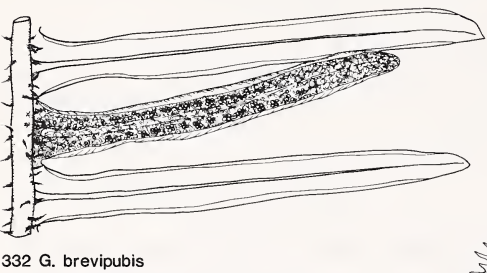
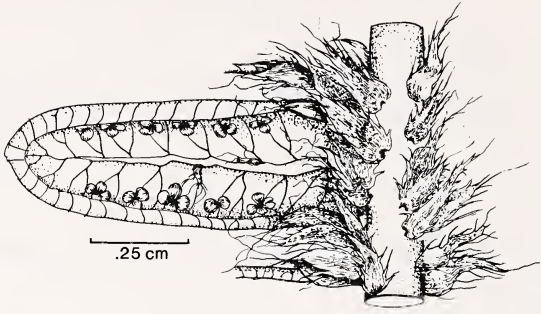
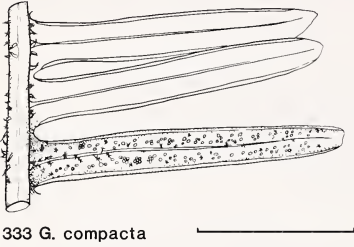
Mertensia bifida Willd. Kongl. Vetensk. Akad. Nya Handl. 25:168, t. 5, f. B. 1804. TYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer* (B-Hb. Willd. 19468 not seen Tryon photo).

Mertensia pubescens Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:73. 1810. TYPE: Sta. Cruz, Cumaná, Edo. Sucre, Venezuela, *Humboldt & Bonpland* (B not seen Morton photo).

Mertensia ferruginea Desv. Ges. Naturf. Freunde Berlin Mag. 5:307. 1811. TYPE: French Guiana, collector unknown (P not seen photo 4481).

Mertensia immersa Kaulf. Enum. Fil. 38. 1824. TYPE: Ilha de Sta. Catarina, Est. Sta. Catarina, Brazil, *Chamisso* (LE not seen fragm M not seen photo 8860).

Plants terrestrial, at 600–1700(2000) m elevation, at forest margins, along roadsides, and on streambanks and landslides, from throughout the Flora area. Also from the Antilles, Central America, and tropical South America.



This species differs slightly from specimens from the Greater Antilles and Mexico to El Salvador that have been called *Dicranopteris cubensis* Underw. or *Mertensia fulva* Desv. in having broad, pale reddish-orange, long-ciliate bud scales. *Gleichenia bifida* is not so much a pioneer on clay banks, and often follows *Dicranopteris pectinata*.

332. *Gleichenia brevipubis* Christ, Bull. Herb. Boissier II, 6:280. 1906.

LECTOTYPE: Valley of the Río Navarro, Pcia. Cartago, 1400 m, *Wercklé* in 1905 (P not seen photo 4478; isolectotypes CR, GH, UC, US fragm NY), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:713. 1977).

Plants terrestrial, at (600)1400–1900(2700) m elevation, in forests and on open banks and roadsides, from La Palma de S. Ramón (Pcia. Heredia), the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito, and Cerro Jefe. Also from Puerto Rico, Mexico, and Honduras.

This species has been confused with *G. bifida*, from which it differs in having an extremely dense, compact, whitish tomentum on the abaxial surface of the laminae and deciduous, atropurpureous, short-ciliate scales on the abaxial surface of the costae.

333. *Gleichenia compacta* Christ, Bull. Herb. Boissier II, 5:254. 1905.

Gleichenia mellifera Christ, Bull. Herb. Boissier II, 6:281. 1906. TYPE: Valley of the Río Navarro, Pcia. Cartago, 1400 m, *Wercklé* (P not seen; isotype US fragm NY).

Gleichenia bradeorum Rosenst. Repert. Spec. Nov. Regni Veg. 10:274. 1912. TYPE: La Palma, Pcia. S. José, 1400 m, *Brade & Brade* 501 (S not seen photo 6128; isotypes B not seen photos 10420–10422, UC, US fragm NY).

TYPE: La Palma, Pcia. S. José, 1600 m, *Wercklé* (P not seen photos 4483–4485 fragm NY, fragm US).

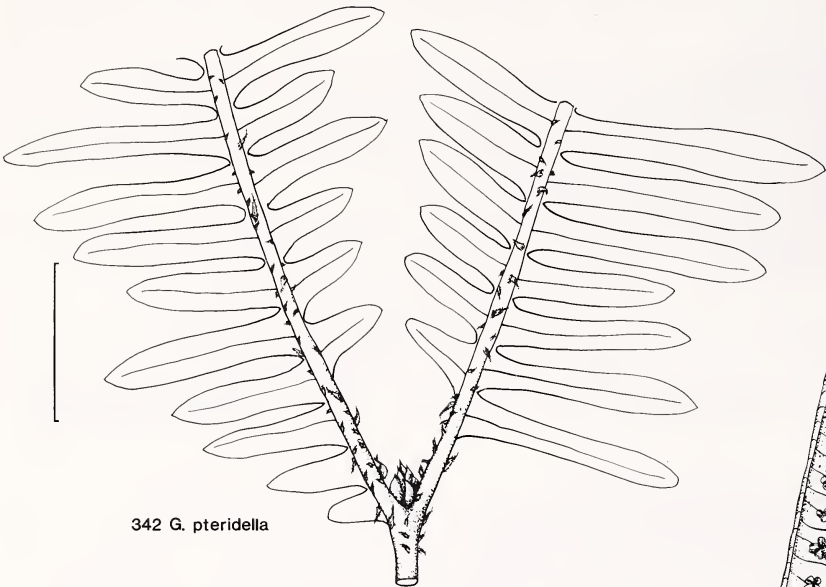
Plants terrestrial, at 600–1400(3300) m elevation, in forests, ravines, and exposed places, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, near Muñeco (Pcia. Cartago), above El Valle, Cerro Azul, Cerro Jefe, and Cerro Pirre.

As shown by *Moore* 6620 (BH, US), the scales and hairs on the abaxial lamina surface are variable in this species. *Gleichenia bradeorum* and part of *G. compacta* are terminal portions of laminae, whereas *G. mellifera* is a basal portion. The scales on terminal portions are reddish-brown with rather long, lax setae; those of the basal portions are darker brown and sometimes paler toward the center of the scale, with fewer, shorter, and stiffer setae.

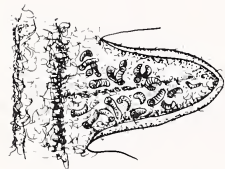
334. *Gleichenia costaricensis* (Underw.) C. Chr. Ind. Fil. Suppl. 1:44. 1913.

Dicranopteris costaricensis Underw. Bull. Torrey Bot. Club 34:253. 1907. TYPE: Volcán Poás, Pcia. Alajuela, 2600 m, *J. D. Smith* 6859 (NY; isotypes B not seen, CR, GH, MO, US).

FIGS. 330–337. *Gleichenia*. FIG. 330. Pinnules of *G. bancroftii*, Molina R. 11502, Honduras. FIG. 331. Ultimate segment of *G. bifida*, Molina, Williams et al. 17412. FIG. 332. Ultimate segments of *G. brevipubis*, Skutch 3514. FIG. 333. Ultimate segments of *G. compacta*, Standley 33860. FIG. 334. Ultimate segment of *G. costaricensis*, Brown CR-162. FIG. 335. Ultimate segments of *G. gnidioides*, Lellinger & de la Sota 491. FIG. 336. Portion of lateral branch of *G. hastulata*, Brade & Brade 502. FIG. 337. Portion of lateral branch of *G. intermedia*, Standley & Valerio 50023.

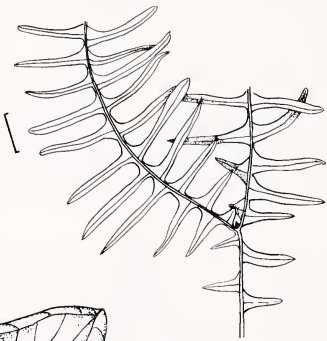


342 *G. pteridella*

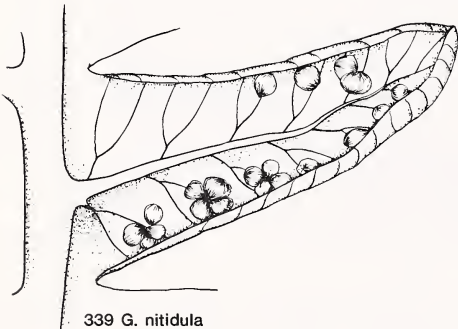


338 *G. maritima*

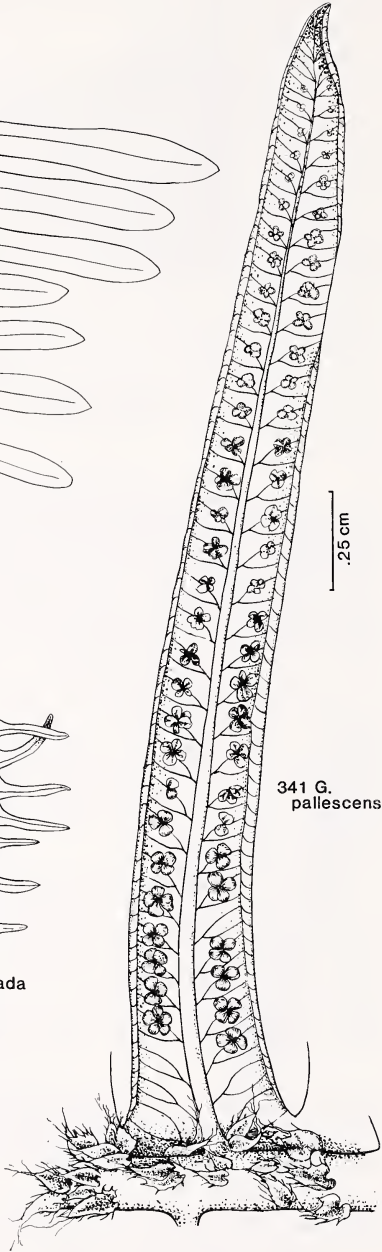
.25 cm



340 *G. orthoclada*



339 *G. nitidula*



341 *G. pallescens*

Plants terrestrial, at (1000)1500–3000 m elevation, in open areas and on road banks, from La Balsa de S. Ramón (Pcia. Alajuela), the Cordillera Central, and the Cordillera de Talamanca to the Cerro de la Muerte. Also from Colombia.

This species is very closely related to *G. revoluta* H.B.K., which has stiffer marginal setae on the lamina scales and rhizome scales borne on low protuberances.

335. *Gleichenia gnidioides* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:266 (repr. 348). 1864.

TYPE: Acostadero, Depto. Chocó, 2400 m, *Triana* (B not seen photo 10335; isotype US).

Plants terrestrial, at 0–100 m elevation, in disturbed places, from the Caribbean side of the divide at El Copé (Pcia. Coclé) and the central Chocó. Also from high elevations in the Cordillera Occidental bordering the Chocó.

This species is distinct in having very short segments and a narrow angle between the branches.

336. *Gleichenia hastulata* Rosenst. Repert. Spec. Nov. Regni Veg. 10:274. 1912.

TYPE: La Palma, Pcia. S. José, 1400 m, *Brade & Brade* 502 (S not seen photo 6140; isotype fragm NY, fragm US).

Plants terrestrial, at 1700–1800 m elevation, on banks, from La Palma and Cerro Colorado above S. Felix (Pcia. Chiriquí).

337. *Gleichenia intermedia* Baker, J. Bot. Brit. For. 25:24. 1887.

Gleichenia axialis Christ, Bull. Herb. Boissier II, 5:14. 1905. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen photos 4494–4495; isotype US).

TYPE: Costa Rica, *Cooper* (K not seen; isotypes GH, US).

Plants terrestrial, at 1600–2400 m elevation, in forests, thickets, and roadsides, from the Cordillera Central, the northern end of the Cordillera de Talamanca, and Cerro Punta (Pcia. Chiriquí).

338. *Gleichenia maritima* Hieron. Bot. Jahrb. Syst. 34:562. 1905.

LECTOTYPE: Near Buenaventura, Depto. El Valle, Colombia, *Lehmann* 4432 (B not seen photo 10337; isolectotype US), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:714. 1977).

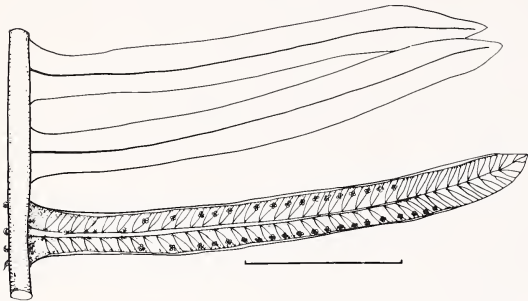
Plants terrestrial, at 700–800 m elevation, in disturbed forests, in the Flora area known only from near Km. 141 of the Ciudad Bolívar–Quibdó road, Depto. Chocó (*Lellinger & de la Sota* 883, COL, LP, US). Also from Pacific coastal Colombia south of the Chocó.

339. *Gleichenia nitidula* Rosenst. Repert. Spec. Nov. Regni Veg. 10:275. 1912.

TYPE: S. Carlos to Buena Vista, Pcia. Alajuela, *Brade* (*Ros. Fil. Costar. Exs. 184*) 503 (S not seen photos 10388–10389, M not seen photo 8863, NY, UC, US).

Plants terrestrial, at 600–900(1100) m elevation, in forests and along roadsides, from La Balsa de S. Ramón (Pcia. Heredia), the Atlantic side of the Cordillera

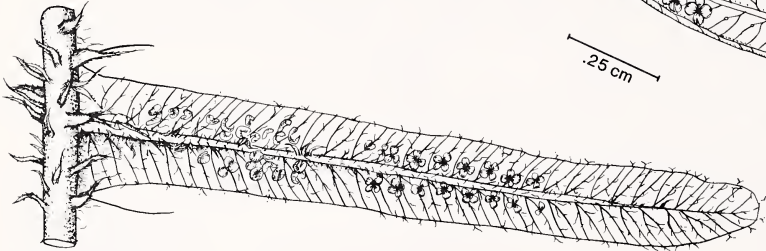
FIGS. 338–342. *Gleichenia*. FIG. 338. Ultimate segment of *G. maritima*, Lellinger & de la Sota 883. FIG. 339. Ultimate segment of *G. nitidula*, Cook & Doyle 30. FIG. 340. Portion of lateral branch of *G. orthoclada*, Cooper. FIG. 341. Ultimate segment of *G. pallescens*, Brown CR-246. FIG. 342. Base of ultimate branches of *G. pteridella*, Maxon 8473.



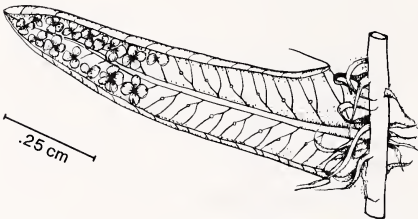
343 *G. remota*



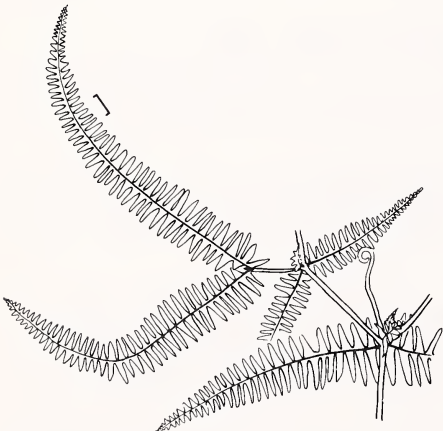
344 *G. retroflexa*



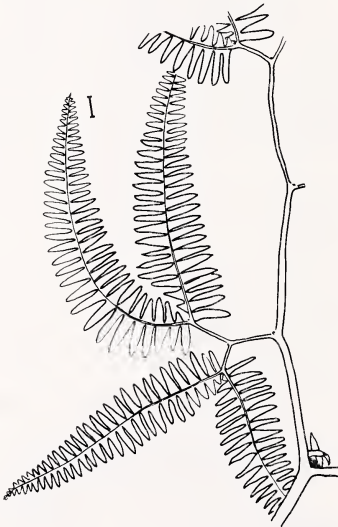
345 *G. rubignosa*



346 *G. strictissima*



347 *G. flexuosa*



348 *G. pectinata*

Central, the Fortuna Dam site (Pcia. Chiriquí), west of Sta. Fé, north of El Valle, and Cerro Jefe (Pcia. Panama). Also from Colombia and Ecuador.

340. *Gleichenia orthoclada* Christ, Bull. Herb. Boissier II, 5:16. 1905.

Gleichenia intermedia var. *dissitifolia* Baker, J. Bot. Brit. For. 25:24. 1887. TYPE: Valle de la Estrella, Pcia. Cartago, 1600–1800 m, *Cooper* (K not seen; isotypes GH, US).

TYPE: Costa Rica, *Wercklé* 212 (P not seen).

Plants terrestrial, at 1500–1800 m elevation, on banks, from the Cordillera Central. This species is said by Gómez (pers. comm.) to be the hybrid between *G. intermedia* and *G. retroflexa*.

341. *Gleichenia pallescens* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:267 (repr. 349). 1864.

Gleichenia bicolor Christ, Bull. Herb. Boissier II, 6:279. 1906. SYNTYPES: Valley of the Río Navarro, Pcia. Cartago, 1400 m, *Wercklé* (P not seen; isosyntypes S not seen photo 6127); and Chemin du Cascajal, *Wercklé* (P not seen). The Goebel collection cited by Christ should be considered a paratype.

TYPE: Velez, Edo. Mérida?, Venezuela, 2100 m, *Lindig* 273 (B not seen; isotypes K not seen Maxon photo 316 and fragm US, P not seen photo 4519).

Plants terrestrial, at 1300–2100 m elevation, along roadside banks, from La Palma de S. Ramón (Pcia. Alajuela), the Cordillera Central, Tapantí, and above Sta. Fé. Also from Venezuela and Colombia.

342. *Gleichenia pteridella* Christ, Bull. Herb. Boissier II, 6:284. 1906.

TYPE: Costa Rica, *Wercklé* in 1903 (P not seen photos 4526–4527; isotype US).

Plants terrestrial, at 1400–2000 m elevation, in open places and roadsides, from the Cordillera de Tilarán, the Cordillera Central, and Cerro Tablazo. Also from Nicaragua.

343. *Gleichenia remota* (Kaulf.) Spreng. Syst. Veg. ed. 16, 4:27. 1827.

Mertensia remota Kaulf. Enum. Fil. 39. 1824. TYPE: Ilha de Sta. Catarina, Est. Sta. Catarina, Brazil, *Chamisso* (LE not seen).

Gleichenia trachyrhizoma Christ, Bull. Herb. Boissier II, 6:280. 1906. TYPE: Valley of the Río Navarro, Pcia. Cartago, 1400 m, *Wercklé* in 1905 (P not seen photo 4541; isotypes CR, UC, US).

Dicranopteris williamsii Maxon, Amer. Fern J. 2:21. 1912. TYPE: Near Cana, Pcia. Darién, R. S. Williams 917 (US; isotype NY).

Gleichenia aequilaterialis Jenm. Ferns Brit. W. Ind. Guiana 353. 1909, as “*aequilaterale*.” TYPE: Upper Demerara River, Guyana, *Jenman* 4149 (NY? not seen).

Plants terrestrial, at 0–1400 m elevation, in forests and along trails and roadsides, from the valley of the Río Navarro (Pcia. Cartago), the Cordillera de Talamanca above S. Isidro del General, the Peninsula de Osa, north of El Valle, near Gamboa (Canal Zone), Cerro Jefe, southeast of Puerto Obaldía (Com. S. Blas), and along the Ciudad Bolívar–Quibdó road at ca. Km. 141 (Depto. Chocó). Also from Cuba, Trinidad to Brazil, Venezuela, and Colombia.

FIGS. 343–348. *Gleichenia* and *Dicranopteris*. FIG. 343. Ultimate segments of *G. remota*, Mickel 2757. FIG. 344. Lateral branches of *G. retroflexa*, Maxon 510. FIG. 345. Ultimate segment of *G. rubiginosa*, Lellinger & de la Sota 744. FIG. 346. Ultimate segment of *G. strictissima*, Chrysler 4990. FIG. 347. Lateral branches of *D. flexuosa*, Smith 2107, Mexico. FIG. 348. Lateral branch of *D. pectinata*, Scamman 6987.

344. *Gleichenia retroflexa* Bomm. & Christ, Bull. Herb. Boissier 4:657. 1896.

Gleichenia intermedia var. *flexuosa* Baker, J. Bot. Brit. For. 25:24. 1887. TYPE: Costa Rica, Cooper (K not seen; isotypes GH, US).

TYPE: La Palma, Pcia. S. José, Pittier 1471 (BR not seen photo 4751; isotype US).

Plants terrestrial, at 600–2500 m elevation, often on exposed clay banks, from the Cordillera Central, Cerro Tablazo, and the northern end of the Cordillera de Talamanca.

345. *Gleichenia rubiginosa* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:267 (repr. 349). 1864.

Gleichenia rubiginosa f. *virescens* Hieron. Bot. Jahrb. Syst. 34:561. 1905. SYNTYPES: Peru, Mathews 1092 (B not seen); and Colombia, Schmidchen in 1882 (B not seen).

TYPE: Puente Nacunol, Depto. Santander, Colombia, 1900 m, Lindig 71 (B not seen photo 10394; isotypes P not seen photo 4504, K not seen Maxon photo 317, fragm US).

Plants terrestrial, at 1400–1800 m elevation, in forests, from Pico Mali and Alto del Buey (both Depto. Chocó). Also from Venezuela to Peru.

This species is doubtfully distinct from *G. strictissima*, and differs in being larger and in having longer segments with more pairs of veins.

346. *Gleichenia strictissima* Christ, Bull. Herb. Boissier II, 5:13. 1905.

Gleichenia glaucina Christ, Bull. Herb. Boissier II, 6:283. 1906. SYNTYPES: Navarro, Pcia. Cartago, Wercklé in 1905 (P not seen photo 4536); and La Palma, Wercklé (P not seen). A presumable unlocalized isosyntype is at US.

TYPE: Costa Rica, Wercklé 215 in 1903 (P not seen photo 4537; isotype US).

Plants terrestrial, at 800–1800 m elevation, on hillsides and wet banks, from S. Ramón, the Cordillera Central, near Tapantí, and Cerro Horqueta (Pcia. Chiriquí).

This species may only be a small form of *G. rubiginosa*.

45. DICRANOPTERIS Bernh.

Plants terrestrial, usually in disturbed places like roadbanks and landslides, often a pioneer on bare soil; rhizomes long-creeping, thin, occasionally forked, hairy, the hairs pluricellular, rather lax to bristle-like, brown; fronds medium to large-sized, often sprawling over other vegetation or forming thickets; stipes long, terete, slightly hairy at the base; laminae deltate to oblong, the rachis bearing distant, opposite pairs of pinnae flanking a terminal bud that elongates to continue the rachis or remains dormant at the frond apex, the bud protected by dark, reddish-brown, pluricellular, straight hairs; pinnae pseudodichotomously divided (appearing nearly pinnately divided in *D. pectinata*), with only the ultimate division laminate, these laminae pectinate, oblong to narrowly elliptic, glabrous adaxially, hairy or glaucous abaxially, mostly subcoriaceous, the axes bearing simple or stellate, brownish hairs or glabrous; veins 2-forked; sori round, exindusiate, composed of usually 8–15 sessile sporangia, paraphyses absent.

Pantropical, mostly at low elevations; 10 species.

MAXON, W. R. 1909. Gleicheniaceae. North Amer. Fl. 16(1):53–63.

1. Reflexed, pinnatifid accessory pinnae absent from each fork of the lamina; pinnae unequally dichotomous, appearing pinnate, with the pinnules (ultimate divisions) equally dichotomous or nearly so; plants usually large, the laminae glaucous on the abaxial surface.

348. *D. pectinata*

1. Reflexed, pinnatifid accessory pinnae present at all but the ultimate forks of the lamina; pinnae equally dichotomous throughout with the central axis of the pinnae often prolonged above the basal dichotomy; plants often medium-sized, not glaucous on the abaxial surface.

347. *D. flexuosa*

347. *Dicranopteris flexuosa* (Schrad.) Underw. Bull. Torrey Bot. Club 34:254. 1907.

Mertensia flexuosa Schrad. Gött. Gel. Anz. 1824:863. 1824. TYPE: Brazil, *Prince Maximilian von Wied-Neuwied* (BR not seen photo BM not seen), cited by Proctor (Ferns Jamaica 82. 1985). Usually Schrader types are to be sought at GOET or LE.

Mertensia rigida Kunze, Linnaea 9:16. 1834. TYPE: Near Chibangata, Peru, *Poeppig 1153* (LZ destroyed; possible isotype L not seen photo 1410).

Mertensia pumila Mart. Icon. Pl. Crypt. Bras. 111, t. 60, f. 2. 1834. TYPE: Serra da Estrella, Est. Rio de Janeiro, Brazil, *Martius* (M not seen photo 8868).

Mertensia scalpturata Fée, Crypt. Vasc. Brésil 1:199, t. 72, f. 1. 1869. SYNTYPES: Brazil, *Claussen 102a* (P not seen), *Glaziou 364* (P not seen photo 4502), Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Glaziou 1695* (P not seen photo 4503).

Plants terrestrial, at 0–1800 m elevation, on hillsides and roadside banks, from the vicinity of Tarbaca (Pcia. S. José), Buenos Aires (Pcia. Puntarenas), Cerro Horqueta (Pcia. Chiriquí), between Cañazas and the foot of the Cordillera Central (Pcia. Veraguas), between Las Minas and Pesé (Pcia. Hererra), Barro Colorado Island (Canal Zone), and Taboga Island and Cerro Azul (both Pcia. Panama). Also from throughout most of tropical America.

348. *Dicranopteris pectinata* (Willd.) Underw. Bull. Torrey Bot. Club 34:260. 1907.

Mertensia pectinata Willd. Kongl. Vetensk. Acad. Nya Handl. 25:168, t. 4. 1804. TYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer* (B-Hb. Willd. 19465 not seen Tryon photo).

Mertensia glaucescens Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:72. 1810. TYPE: Cumaná, Edo. Sucre, Venezuela, *Humboldt & Bonpland* (B not seen Morton photo; isotype P not seen photo 4525).

Mertensia brasiliana Desv. Ges. Naturf. Freunde Berlin Mag. 5:329. 1811. TYPE: Brazil, *collector unknown* (P not seen photo 4522).

Mertensia emarginata Raddi, Pl. Bras. Nov. Gen. 1:72, t. 6. 1825, nom. superfl. TYPE: A renaming of *Mertensia glaucescens* Humb. & Bonpl. ex Willd., which was cited in synonymy, and so based on the type of that name.

Gleichenia nitida K. Presl, Reliq. Haenk. 1:70. 1825. TYPE: Mexico, *Haenke* (PRC not seen frags NY not seen, US).

Mertensia elata Desv. Mém. Soc. Linn. Paris 6:201. 1827. TYPE: Jamaica, *collector unknown* (P-Hb. Desv. not seen Cintract photo at UC).

Mertensia glaucescens var. *cubense* Fée, Hist. Foug. Antill. [Mém. Foug. 11]:121. 1866. TYPE: Cuba, *collector unknown* (not seen).

Mertensia glaucescens var. *mexicana* Fée, Hist. Foug. Antill. [Mém. Foug. 11]:121. 1866. SYNTYPES: Mexico, *Galeotti 6402* (P not seen); and Hispaniola, *de Tussac* (P? not seen).

Mertensia dichotoma var. *L'herminieri* Fée, Hist. Foug. Antill. [Mém. Foug. 11]:121. 1866. TYPE: Calumet, Guadeloupe, *L'Herminier 97* (presumably P-Hb. Bory not seen; isotype US).

Gleichenia linearis var. *depauperata* Christ, Bull. Herb. Boissier II, 5:14. 1905. TYPE: Costa Rica, *Wercklé* (P not seen).

Gleichenia pectinata var. *sublinearis* Christ, Bull. Herb. Boissier II, 6:282. 1906. LECTOTYPE: Navarro, Pcia. Cartago, 3500 ft, *J. D. Smith 4994* (US; islectotype P not seen), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:714. 1977).

Plants terrestrial, at 0–1700 m elevation, often on stream banks or along roads, from the Cordillera Central, the Cordillera de Talamanca, throughout Panama and the Chocó. Also from throughout the Antilles, Central America, and tropical South America.

This species commonly is a pioneer on road cuts.

POLYPODIACEAE

Rhizomes long-creeping, short-creeping, ascending, or erect, ca. 1–10 mm in diam., scaly (the scales rarely absent), the scales entire or erose, often bearing surficial hairs, marginal hairs, or marginal setae; fronds minute to medium-sized; stipes articulate (the phyllopodia low) or not; laminae simple and entire or lobed, pinnatifid, pinnatisect, pinnate, or rarely more divided, usually glabrous, sometimes softly pubescent or bearing stiff, usually dark setae, the midribs or rachises sometimes also scaly; veins free to fully anastomosing without sterile included veinlets in most genera (free included veinlets present in *Microgramma* and *Pleopeltis*); sori superficial or sunken into the lamina tissue, rarely elongate or linear, usually round and borne at the apex of a vein or at the junction of several veins, this sometimes ring-shaped; indusia absent; sporangia long-stalked, globose; linear to clavate or branched paraphyses often present (caducous, peltate, scale-like paraphyses present in *Pleopeltis*); spores monolete or trilete.

1. Laminae narrowly spatulate, acuminate at the apex, attenuate at the base, the stipes obsolete; indusia elongate to linear and nearly parallel to the midrib; rhizome scales strongly clathrate with iridescent lumina.

60. *Loxogramme*

1. Plants not as above..2.

2(1). Stipes usually variously sulcate, rarely wiry (terete and often wiry in *Pechuma*), articulate to the rhizome, the older portions of the rhizome bearing low, usually closely set phyllopodia (except in *Hyalotrichopteris*); rhizomes generally short- to long-creeping and conspicuous, often branched; laminae glabrous or scaly or soft hairy, at least on the rachis or midrib..5.

2(1). Stipes always terete, usually wiry, not or apparently not articulate to the rhizome, the rhizomes lacking phyllopodia: rhizomes generally erect or ascending and inconspicuous, unbranched; laminae glabrous or commonly bearing stiff, dark, setiform hairs on the surface, margins, or rachis or in the sori..3.

3(2). Sporangia in linear coenosori, 1 on each side of the midrib of the fertile lamina or fertile portion of the lamina.

59. *Cochlidium*

3(2). Sporangia in round or elongate sori, several on each side of the midrib..4.

4(3). Laminae entire, repand, or shallowly lobed, commonly thick and spongy; sori irregular in shape, mostly at least slightly elongate, often in pits in the lamina tissue.

58. *Glyphotaenium*

4(3). Laminae entire, deeply lobed, pinnatifid, pinnatisect, or rarely pinnate or more divided, rarely thick and spongy; sori regular, round, rarely in pits in the lamina tissue.

57. *Grammitis*

5(2). Laminae pinnatisect with narrow, closely set segments; stipes terete, mostly dark brown or blackish; rhizome scales attached at the base.

56. *Pechuma*

5(2). Laminae entire, shallowly to deeply lobed, pinnatifid, pinnatisect, pinnate, or more divided, if pinnatisect, the segments relatively broad and distant; stipes variously sulcate, often pale brown; rhizome scales peltately attached..6.

6(5). Sori superficial on the abaxial surface, round or occasionally elongate..8.

6(5). Sori marginal, linear, rarely interrupted..7.

7(6). Fronds several times dichotomously branched, usually bearing minute scales on the abaxial surface; stipes and axes blackish.

50. *Dicranoglossum*

7(6). Fronds simple, entire, glabrous on the abaxial surface; stipes and axes pale brown.

49. *Neurodium*

8(6). Laminae simple or shallowly lobed (pinnate with unlobed pinnae in a few species of *Campyloneurum*, with prominent primary veins and two rows of sori between the veins); rhizomes mostly very long-creeping, wire- or cord-like, occasionally thick and short-creeping (as in *Niphidium*)..11.

8(6). Laminae deeply lobed, pinnatifid, pinnatisect, or more divided; rhizomes mostly ascending or short-creeping, rather thick..9.

9(8). Venation free (1- to several times forked), casually anastomosing, or with 1 to several rows of areolae with a single unbranched excurrent veinlet in each areola.

55. *Polypodium*

9(8). Venation mostly of polygonal areolae lacking excurrent sterile veinlets, the excurrent fertile veinlets double and fused under the round sori or irregularly disposed under the elongate sori..10.

10(9). Sori round; rhizomes ca. 5 mm thick, contorted, bearing orangish scales; veins decidedly prominulous on the abaxial surface of the laminae.

54. *Phlebodium*

10(9). Sori elongate to oval, rarely round; rhizomes ca. 3 mm thick, not contorted, bearing pale brown scales; veins scarcely prominulous on the abaxial surface of the laminae.

47. *Pseudocolysis*

11(8). Laminae with decidedly prominulous main and transverse veins, the tertiary veins many and irregular; sori in a single row between the main veins.

51. *Niphidium*

11(8). Laminae not as above..12.

12(11). Venation partially or entirely of polygonal areolae, lacking straight or flexuous, prominulous or occult main side veins..14.

12(11). Venation of straight or flexuous, prominulous or occult main side veins and transverse secondary veins bearing (1)2(3 or more) unbranched excurrent fertile and sterile veinlets..13.

13(12). Laminae thinly pilose, the hairs ca. 1 mm long, multicellular, clear, with prominent cross-walls; plants epipetric; fronds 3–9 cm long.

52. *Hyalotrichopteris*

13(12). Laminae lacking hairs (except thinly pilosulous, the hairs ca. 0.1 mm long in *Campyloneurum occultum*); plants usually epiphytic; fronds mostly longer than 10 cm.

53. *Campyloneurum*

14(12). Sori (1)2 per fertile areola; laminae glabrous or sometimes sparsely scaly on the abaxial surface of the midribs. Midrib scales narrowly lanceolate or narrowly lanceate.

53. *Campyloneurum*

14(12). Sori 1(2) per fertile areola; laminae glabrous to densely scaly on both surfaces..15.

15(14). Laminae dull, sparsely to densely scaly on both surfaces, the scales orbicular to lanceolate; midribs usually blackish on the abaxial surface, darker than the laminae; sori round to oval, usually protected by peltate paraphyses when very young.

46. *Pleopeltis*

15(14). Laminae shiny, glabrous to sparsely scaly on both surfaces, the scales acicular from an orbicular base; midribs not blackish on the abaxial surface; sori round, mixed with usually inconspicuous non-peltate paraphyses.

48. *Microgramma*

46. PLEOPELTIS Humb. & Bonpl.

Plants epiphytic; rhizomes wiry, very long-creeping, scaly, the scales peltate or lanceolate with a peltate attachment, weakly clathrate or not clathrate, often irregular at the margin; stipes articulate to the rhizome or to low phyllopodia, often (with the midrib) blackish; fronds small, simple; laminae usually rather narrowly elliptic, chartaceous to subcoriaceous, dull, sparsely scaly, the scales small to minute, peltate or lanceolate; veins irregularly anastomosing with free

included veinlets; sori large, round or sometimes elongate, protected when young by overlapping scales (except *P. percussa*, with abundant dark, reddish-brown sporangiasters), exindusiate; sporangia long-stalked.

Pantropical; ca. 40 species.

WEATHERBY, C. A. 1922. The group of *Polypodium lanceolatum* in North America. *Contr. Gray Herb.* 65:3–14.

1. Rhizome scales not clathrate or only the central cells so, with small and rather obscure lumina and with the pale, marginal cells often worn away in age leaving only the central cells..4.

1. Rhizome scales entirely clathrate or only one row of marginal cells not so, with large, clear lumina and with the marginal cells not worn away in age..2.

2(1). Sori confluent, forming a single coenosorus on each side of the midrib; sterile laminae 6–10 times wider than the fertile ones. Sterile laminae lanceolate or elliptic, 3–11 cm long, 1–3 cm wide; fertile laminae linear, 4–10 cm long, 3–5 mm wide.

356. *P. wiesbaurii*

2(1). Sori oval or elongate, but not confluent; sterile laminae (1)1.5–4 times wider than the fertile ones..3.

3(2). Sterile laminae 2–4 times wider than the fertile ones; rhizomes 2–3 mm in diam.; midribs of the sterile fronds stramineous abaxially. Sterile laminae elliptic-lanceolate, round or acute at the apex, acute at the base, 4–11 cm long, 0.8–2.8 cm wide; fertile laminae linear, 4–12 cm long, 0.4–1 cm wide.

350. *P. frutuosa*

3(2). Sterile laminae (1)1.5–2(2.5) times wider than the fertile ones; rhizomes 1 mm in diam.; midribs of the sterile fronds blackish abaxially. Sterile laminae elliptic, acute to acuminate at the base, acute at the apex, 4–8 cm long, 1.5–3 cm wide; fertile laminae linear, 5–9 cm long, 1(1.5) cm wide.

354. *P. panamensis*

4(1). Rhizome scales orbiculate, peltate, ca. 0.5 mm in diam., blackish at the center, with pale, ciliate-toothed margins, bearing on their surface abundant, reddish-brown, unicellular trichomes up to ca. 1 mm long; sori oval to oblong. Stipes 0.5–2 cm long; laminae usually linear, 2.5–9(10) cm long, 0.4–1(1.6) cm wide.

349. *P. astrolepis*

4(1). Rhizome scales lanceolate, peltately attached near the base, 1–4 mm long, bicolorous (except in *P. percussa*), not concealed by reddish-brown trichomes; sori round to oval..5.

5(4). Paraphyses in sori abundant, dark reddish-brown, with a few yellowish sporangia scattered among them. Stipes 0.5–4 cm long; laminae linear, acuminate to attenuate at the base, often caudate at the apex, 10–20(25) cm long, 1–1.5(2.5) cm wide.

355. *P. percussa*

5(4). Paraphyses in sori few to none. Laminae 6–20 cm long, 1–1.5(2) cm wide..6.

6(5). Laminae shallowly to deeply and irregularly lobed. Laminae lanceolate, 12–14 cm long, 1.5–3 cm wide.

351. *P. leucospora*

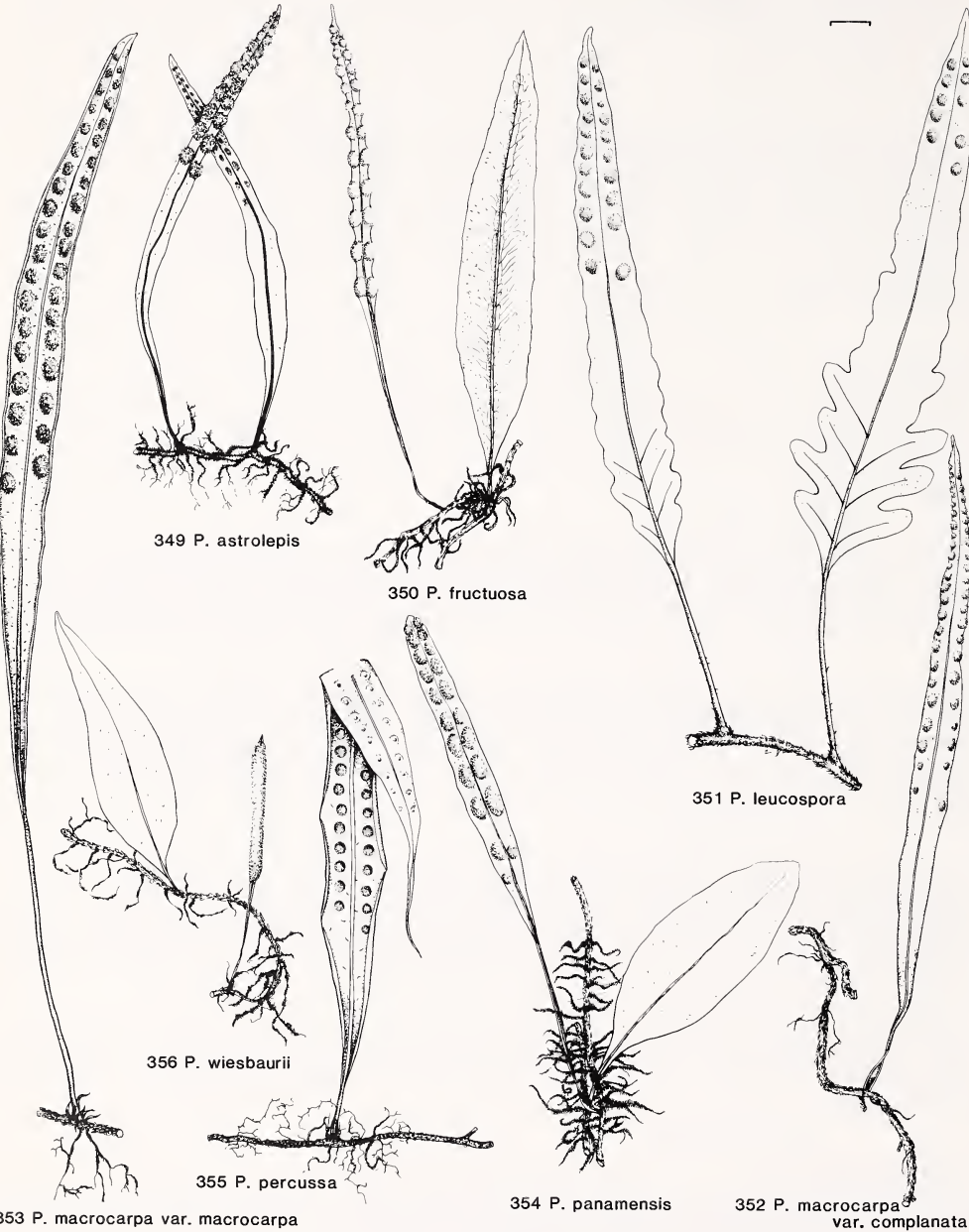
6(5). Laminae entire..7.

7(6). Stipes compressed; sori 1–3 mm wide; rhizome scales 1–2 mm long. Stipes 0.5–6 cm long; laminae 8–15(20) cm long, 0.5–1.5(2) cm wide; sori submarginal.

352. *P. macrocarpa* var. *complanata*

7(6). Stipes terete; sori 2.5–5 mm wide; rhizome scales (1.5)2–4 mm long. Stipes 1.5–9 cm long; laminae 10–20 cm long, 1–2(2.5) cm wide; sori supramedial to submarginal.

353. *P. macrocarpa* var. *macrocarpa*



349. *Pleopeltis astrolepis* (Liebm.) Fourn. Mexic. Pl. 1:87. 1872.

Grammitis lanceolata Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 1:9, t. 7 p.p. 1804, non *Pleopeltis lanceolata* Kaulf., 1824. TYPE: Jamaica, Swartz (HAL not seen). Schkuhr's citation of *G. lanceolata* Swartz refers to an Old World specimen and is in error.

Grammitis elongata Swartz, Syn. Fil. 22, 213. 1806, non *Pleopeltis elongata* Kaulf., 1824. TYPE: Based on *G. lanceolata* sensu Schkuhr excl. syn.

Grammitis revoluta Spreng. ex Willd. Sp. Pl. ed. 4, 5:139. 1810, non *Pleopeltis revoluta* v. A. v. R., 1909. TYPE: Without locality, collector unknown (B-Hb. Willd. 19584 not seen microfiche S. I. Library).

Grammitis squamulosa Splitg. Tijdschr. Natuurl. Gesch. Physiol. 7:398. 1840, non *Pleopeltis squamulosa* (Kaulf.) K. Presl, 1836, nom. illeg. TYPE: Surinam, collector unknown (L not seen).

Polypodium astrolepis Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:185 (repr. 33). 1849. LECTOTYPE: Trapiche de la Concepción, Edo. Oaxaca, Mexico, Liebm. Fl. Mex. 87 in 1841, lower plant (C not seen), chosen by A. R. Smith (Fl. Chiapas 2:177. 1981).

Drynaria prieurii Fée, Gen. Fil. [Mém. Foug. 5]:271. 1852. SYNTYPES: French Guiana, Leprieur (RB not seen; possible isotype US); and Martinique, Rivoire (P or RB not seen).

Pleopeltis angustifolia D. C. Eaton, Amer. J. Sci. Arts II, 27:198. 1859. TYPE: Based ultimately on *Grammitis elongata* Swartz, and so based on the type of that name.

Taenitis swartzii Jenm. J. Bot. Brit. For. 17:263. 1879, nom. superfl. TYPE: A renaming of *Grammitis elongata* Swartz, and so based on the type of that name.

Plants epiphytic, at 0–1400(3000) m elevation, in forests and on trees in open areas, from the Cordillera Central, the Meseta Central, Cerro Carpintera, the Atlantic coastal plain of Costa Rica, the Cordillera de Talamanca to Pcia. Chiriquí, El Valle, and Alcalde Díaz (Pcia. Panama). Also from throughout tropical America.

350. *Pleopeltis fructuosa* (Maxon & Weath. in Weath.) Lellinger, Proc. Biol. Soc. Wash. 89:722. 1977.

Polypodium fructuosum Maxon & Weath. in Weath. Contr. Gray Herb. 65:12. 1922. TYPE: Upper Caldera River, Holcomb's trail above Boquete, 1450–1650 m, Maxon 5689 (US).

Plants epiphytic, at 1000–2500 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, and the Cordillera de Talamanca to Pcia. Chiriquí.

351. *Pleopeltis leucospora* (Klotzsch) T. Moore, Ind. Fil. 77. 1857.

Polypodium leucosporum Klotzsch, Linnaea 20:404. 1847. TYPE: Páramo de Mucuchíes, Edo. Mérida, Venezuela, Moritz 306 (B not seen).

Polypodium lanceolatum var. *elisabethae* Jenm. Bull. Bot. Dept. Jamaica N.S., 4:199. 1897. TYPE: Near Cinchona, Jamaica, collector unknown [Jenman?] (IJ not seen U. S. Natl. Herb. photo 3038).

Plants epiphytic, at 2000–2100 m elevation, in forests and in open areas, in the Flora area known only from the Laguna de Zarcero, Pcia. Alajuela (*A. Smith* 1432, NY). Also from Jamaica, Hispaniola, Venezuela, Colombia, and Peru.

Wagner (Fern Gaz. 11:125–135. 1975) demonstrated that this is the hybrid between *Polypodium* (*Marginaria*) *thyssanolepis* A. Braun and *Polypodium lanceolatum* L., which is a synonym of *Pleopeltis macrocarpa* (Bory ex Willd.)

FIGS. 349–356. *Pleopeltis*. FIG. 349. Plant of *P. astrolepis*, Alfaro 6026. FIG. 350. Plant of *P. fructuosa*, Standley & Valerio 49243. FIG. 351. Plant of *P. leucospora*, Smith 1432 (NY). FIG. 352. Plant of *P. macrocarpa* var. *complanata*, Knight. FIG. 353. Plant of *P. macrocarpa* var. *macrocarpa*, Maxon 8486. FIG. 354. Plant of *P. panamensis*, Maxon 5784. FIG. 355. Plant of *P. percussa*, Stork 2282. FIG. 356. Plant of *P. wiesbaurii*, Mickel 2993.

Kaulf. var. *macrocarpa*. I place this hybrid in *Pleopeltis* because in frond and rhizome form it seems more allied to the other species of that genus than it does to the species of *Polypodium* subg. *Marginaria*. If hybrids between *Pleopeltis* and *Polypodium* are assigned to a separate genus, the correct name for this hybrid is *Polypodium* \times *leucosporum* (Klotzsch) Mickel & Beitel.

352. *Pleopeltis macrocarpa* var. *complanata* (Weath.) Lellinger, Proc. Biol. Soc. Wash. 89:722. 1977.

Polypodium lanceolatum var. *complanatum* Weath. Contr. Gray Herb. 65:8. 1922. TYPE: Juan Viñas, Pcia. Cartago, Pittier 1855 (US).

Plants epiphytic, at 1200–2200(2500) m elevation, in forests and open areas, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí.

353. *Pleopeltis macrocarpa* (Bory ex Willd.) Kaulf. Berlin Jahrb. Pharm. 21:41. 1820, var. *macrocarpa*.

Polypodium lanceolatum L. Sp. Pl. 2:1082. 1753, non *Pleopeltis lanceolata* Kaulf., 1824. TYPE: Plate 6, f. 2 of Petiver's "Pterigaphia Americana," which is a transposed redrawing of t. 137 of Plumier's "Traité..." which illustrates a specimen collected by Plumier on Hispaniola. See also Pichi Sermolli (Webbia 20:349. 1965) for a discussion of the typification of this species.

Polypodium macrocarpum Bory ex Willd. Sp. Pl. ed. 4, 5:147. 1810. TYPE: Mauritius, Bory (B-Hb. Willd. 19629 not seen; isotype P not seen).

Plants epiphytic, at (600)1600–3100 m elevation, in forests and open areas, from the Hacienda Santamaría in the Cordillera de Tilarán (Pcia. Alajuela), the Cordillera Central, and the eastern slopes of Volcán Chiriquí. Also from Cuba, Jamaica, Hispaniola, Mexico to Honduras, Nicaragua, Venezuela, Colombia to Chile, Guyana, Brazil, Uruguay, and Argentina.

354. *Pleopeltis panamensis* (Weath.) Pic. Ser. Webbia 23:189. 1968.

Polypodium panamense Weath. Contr. Gray Herb. 65:13. 1922. TYPE: Around Portobelo, Pcia. Colón, 5–200 m, Maxon 5784 (US; isotypes F, GH, NY).

Plants epiphytic, at 0–200 m elevation, from Bismarck (Pcia. Coclé), Ft. Sherman (Canal Zone), Portobelo and the Rios Medio and Guanche (all Pcia. Colón).

355. *Pleopeltis percussa* (Cav.) Hook. & Grev. Icon. Fil. t. 67. 1828.

Polypodium percussum Cav. Descr. Pl. 243. 1801. TYPE: Peru, *Née* (MA not seen Killip photo).

Polypodium rostratum Cav. Descr. Pl. 244. 1801, non Burm., 1768, nom. illeg. TYPE: Mt. S. Antonio, Ecuador, *Née* (MA not seen), examined by Christensen (Dansk Bot. Ark. 9(3):11. 1937).

Polypodium avenium Desv. Ges. Naturf. Freunde Berlin Mag. 5:314. 1811. TYPE LOCALITY: Brazil. Synonymized by Desvaux (Mém. Soc. Linn. Paris 6:227. 1827).

Polypodium cuspidatum K. Presl, Reliq. Haenk. 1:20, t. 1, f. 3. Jun–Nov 1825, non Don, 1 Feb 1825, nom. illeg. TYPE: Panama, *Haenke* (PRC not seen).

Polypodium stigmaticum K. Presl, Reliq. Haenk. 1:20, t. 3, f. 2. 1825. TYPE: Mountains at Huánuco, Depto. Huánuco, Peru, *Haenke* (PRC not seen).

Polypodium microlepidum Desv. Mém. Soc. Linn. Paris 6:228. 1827. TYPE: Peru, collector unknown (P-Hb. Desv. not seen), synonymized by Weatherby (Contr. Gray Herb. 114:32. 1936).

Polypodium elongatum Desv. Mém. Soc. Linn. Paris 6:228. 1827, non Aiton, 1789, nom. illeg. TYPE: Brazil, collector unknown (P-Hb. Desv. not seen), examined by Weatherby (Contr. Gray Herb. 114:30. 1936).

Polypodium haenkeanum Spreng. Syst. Veg. ed. 16, 4:46. 1827, nom. superfl. TYPE: A renaming of *P. stigmaticum* K. Presl, and so based on the type of that name.

Polypodium percussum var. *squamosum* Christ in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 232. 1896. TYPE: Carrillo, Pcia. S. José, 300 m, *Pittier 1164* (BR not seen).

Plants epiphytic, at 0–1200(1700) m elevation, in forests and open areas, from throughout the Flora area. Also throughout tropical Central and South America.

356. *Pleopeltis wiesbaurii* (Sodirol) Lellinger, Proc. Biol. Soc. Wash. 89:723. 1977.

Drymoglossum wiesbaurii Sodirol, Anales Univ. Quito 11(75):312 (repr. 419). 1894. TYPE: Río Chimbo, Pcia. Guayas, Ecuador, 300–500 m, *Sodirol* (Hb. Sodirol not seen).

?*Polypodium bonapartii* Rosenst. Repert. Spec. Nov. Regni Veg. 7:309. 1909. TYPE: Río Chasuan, Mt. Chimborazo, Pcia. Chimborazo, Ecuador, *Spruce 5731* (S? or P? not seen Bonaparte photo).

Pteropsis underwoodiana Maxon, Contr. U. S. Natl. Herb. 16:51, t. 28. 1912. TYPE: Near Suerre, Llanuras de Sta. Clara, Pcia. Limón, 300 m, *J. D. Smith 6941* (US; isotype NY).

Plants epiphytic, at 0–1200 m elevation, in forests, from the Cordillera de Tilarán, the foothills of the Cordillera Central, the Meseta Central, the Atlantic coastal plain of Costa Rica, the valley of the Río General, and above El Valle and El Copé (Pcia. Coclé). Also from Ecuador.

This species is probably related to, or may even be conspecific with, the little-known Ecuadorian *Polypodium chionolepis* Sodirol. The only character that sets this species, which is the type of the genus *Marginariopsis*, apart from other species of *Pleopeltis* is its coenosori. In venation and chromosome number ($x=35$, according to F. Wagner, pers. comm.), it is a *Pleopeltis*; its rhizome scales are like those of *P. fructuosa* and *P. panamensis*. Either of the latter species could be considered *Marginariopsis*, but both lack coenosori, and *P. panamensis* is not always dimorphic. Since a continuum of characteristics occurs in these three species, generic or even infrageneric separation is not warranted for any of them.

47. PSEUDOCOLYSIS Gómez

Plants epiphytic; rhizomes thin, long-creeping, scaly, the scales linear-lanceolate, attached at the base, weakly clathrate at the center, with pale, erose margins; stipes articulate to the rhizome, narrowly alate for most of their length; fronds medium-sized; laminae deeply pinnatifid (juveniles often simple), herbaceous, dull, scaly, the scales minute, peltate; veins irregularly anastomosing with a few included veinlets; sori linear, ascending, exindusiate, lacking paraphyses; sporangia long-stalked.

Central America; 2 species.

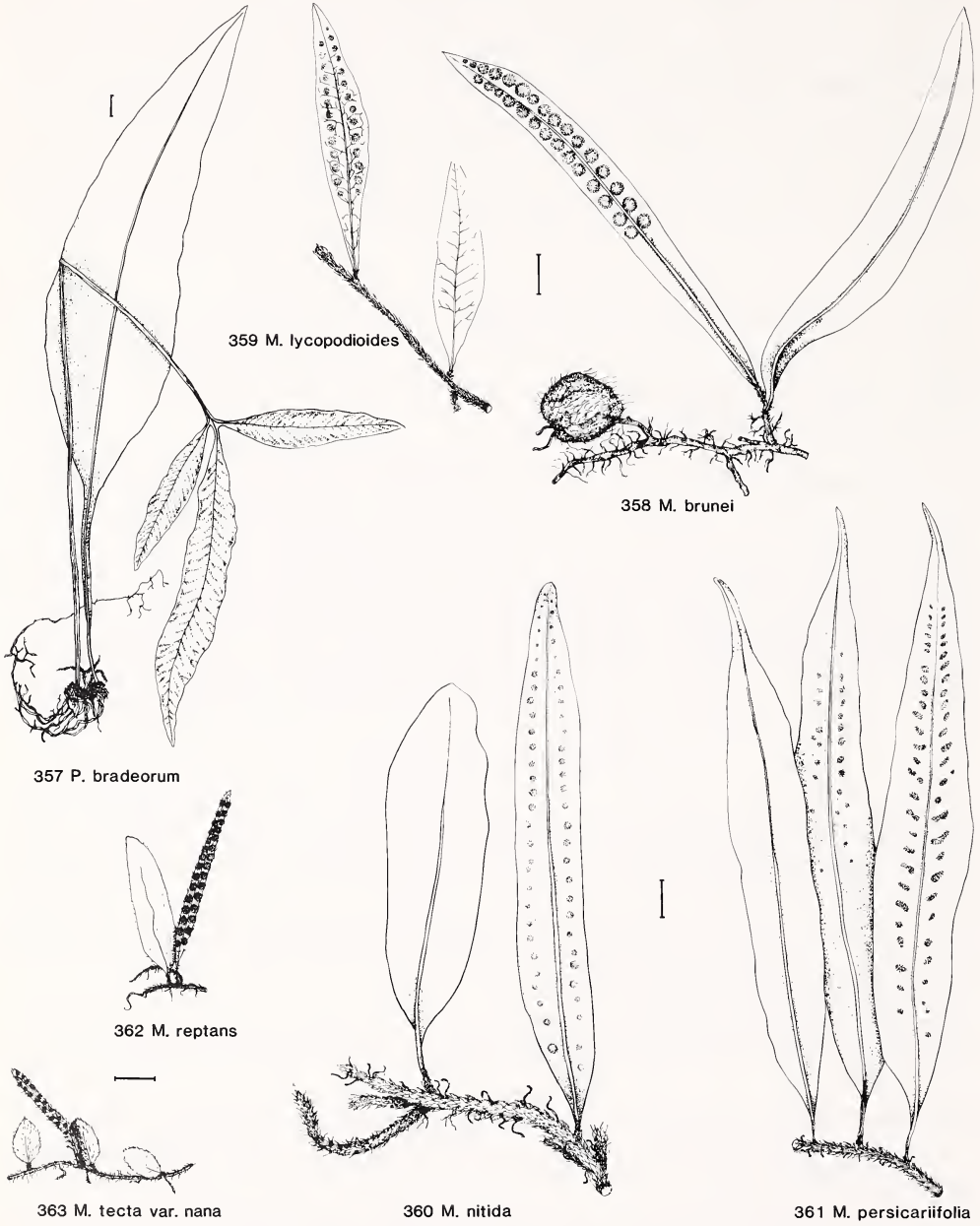
GÓMEZ P., L. D. 1977. Contribuciones a la pteridología Centroamericana II. Novitates. Brenesia 10/11:115–119.

357. *Pseudocolysis bradeorum* (Rosenst.) Gómez, Brenesia 10/11:116. 1977.

?*Polypodium guatemalense* Klotzsch, Allg. Gartenzeitung 23:33. 1855. TYPE: Guatemala, *Warszewicz?* (B? not seen).

Polypodium bradeorum Rosenst. Repert. Spec. Nov. Regni Veg. 10:279. 1912. TYPE: Llanuras de S. Carlos, Pcia. Alajuela, 200 m, *Brade & Brade 460* (S not seen photo 5957; isotypes UC, US).

Plants terrestrial, at 100–200 m elevation, in forests, from the northern Atlantic coastal plain of Costa Rica and Changuinola (Pcia. Bocas del Toro). Also from Mexico, Belize, and Nicaragua.



The epithet *guatemalense* is earliest, if *P. guatemalense* is synonymous.

48. MICROGRAMMA K. Presl

Plants epiphytic; rhizomes usually wiry, long-creeping, scaly, the scales lanceolate, sometimes narrowly so with a hair-like apex, not clathrate except for the peltate attachment, usually entire; stipes obsolete or short and alate, articulate to the rhizome or to low phyllopodia; fronds small, simple, subdimorphic or dimorphic (the fertile fronds narrow); laminae ovate or elliptic to linear, chartaceous, shiny, mostly glabrous, the midribs pale; veins irregularly anastomosing with free included veinlets; sori usually small to large, round (elongate in a few species); paraphyses often present; sporangia long-stalked.

Neotropics and tropical Africa and adjacent islands; ca. 20 species.

1. Laminae glabrous on both surfaces or with a few narrow scales on the abaxial surface of the midrib..3.

1. Laminae sparsely to densely scaly on both surfaces. Fertile laminae much narrower than the sterile ones..2.

2(1). Sterile fronds usually lanceolate or elliptic, rarely suborbiculate, (8)15–40(55) mm long, sparsely covered on both surfaces with linear scales less than 1 mm long having a peltate base much wider than the apical portion of the scale.

362. *M. reptans*

2(1). Sterile laminae usually suborbiculate to ovate, rarely lanceolate, 3–15(18) mm long, densely covered on both surfaces with narrowly lanceolate scales ca. 1 mm long having a peltate base only slightly wider than the apical portion of the scale.

363. *M. tecta* var. *nana*

3(1). Fertile laminae much narrower than the sterile ones; spherical tubers 2–3 cm in diam. present on the rhizomes. Sterile laminae 3–12 cm long, 5–13 mm wide, acute or acuminate at the apex, attenuate and exstipitate at the base.

358. *M. brunei*

3(1). Fertile laminae only slightly narrower than the sterile ones; spherical tubers absent..4.

4(3). Rhizomes (including the scales) 2–4(5) mm in diam. Sterile laminae broadly to narrowly elliptical, acute at the base, 6–11 cm long, (1.2)2–4 cm wide.

360. *M. nitida*

4(3). Rhizomes (including the scales) 1–2(3) mm in diam...5.

5(4). Sori round; sterile laminae 2–9.5 cm long, 0.8–1.7 cm wide; rhizome scales reddish, ca. 0.5 mm wide.

359. *M. lycopodioides*

5(4). Sori slightly elongate, at ca. a 45° angle to the midrib; sterile laminae 7–17 cm long, 1.5–2.5 cm wide; rhizome scales whitish, ca. 1 mm wide.

361. *M. persicariifolia*

358. *Microgramma brunei* (Wercklé ex Christ) Lellinger, Amer. Fern J. 67:59. 1977.

Polypodium brunei Wercklé ex Christ, Bull. Soc. Bot. Genève II, 1:221. 1909. TYPE: Carrillo, Pcia. S. José, Wercklé (P).

Plants epiphytic, at 700–1300 m elevation, in forests, from the Atlantic slopes of the Cordillera Central, the northern end of the Cordillera de Talamanca,

FIGS. 357–363. *Pseudocolysis* and *Microgramma*. FIG. 357. Plant of *P. bradeorum*, Mickel 3484. FIG. 358. Plant of *M. brunei*, Correa & Dressler 176. FIG. 359. Plant of *M. lycopodioides*, Mickel 2341. FIG. 360. Plant of *M. nitida*, Morley 790. FIG. 361. Plant of *M. persicariifolia*, Stern et al. 231. FIG. 362. Plant of *M. reptans*, Schubert 1323. FIG. 363. Plant of *M. tecta* var. *nana*, Holm & Iltis 193.

northeast of the Fortuna Camp reservoir site (Pcia. Chiriquí), north of El Valle, Cerro Jefe and Cerro Campana (Pcia. Panama), and the Tutunendo–El Carmen road near Camp 12 (Depto. Chocó). Also from other localities in Colombia.

359. *Microgramma lycopodioides* (L.) Copel. Gen. Fil. 185. 1947.

Polypodium lycopodioides L. Sp. Pl. 2:1082. 1753. TYPE: Locality and collector unknown (LINN 1251.2 not seen microfiche S. I. Library).

Polypodium salicifolium Willd. Sp. Pl. ed. 4, 5:149. 1810, non Vahl, 1807, nom. illeg. TYPE: Brazil, *Hoffmannsegg* (B-Hb. Willd. 19603 not seen Tryon photo).

Polypodium venosum Desv. Ges. Naturf. Freunde Berlin Mag. 5:314. 1811, non Lour., 1790, nom. illeg. TYPE: French West Indies, collector unknown (P-Hb. Desv. not seen; probable isotype P-Hb. Juss. 1061 not seen photo 2924). Synonymized by Weatherby (Contr. Gray Herb. 114:33. 1936).

Polypodium pellitum Willd. ex Kaulf. Enum. Fil. 89. 1824. TYPE: Brazil, *Commerson* (P-Hb. Willd. 19604 not seen Tryon photo). Synonymized by Morton (Contr. U. S. Natl. Herb. 38:64. 1967).

Polypodium salicinum Wikstr. Kongl. Vetensk. Acad. Handl. II, 12:443. 1826. TYPE: A renaming of *P. salicifolium* Willd., and so based on the type of that name.

Polypodium funiculosum Desv. Mém. Soc. Linn. Paris 6:226. 1827. TYPE: A renaming of *P. lycopodioides* sensu Poir. (Enc. Méth. 5:509. 1804), syn. excl., and so based on the type of that name, which is Hispaniola, collector unknown (P not seen).

Polypodium venulosum Desv. Mém. Soc. Linn. Paris 6:226. 1827. TYPE: A renaming of *P. venosum* Desv., and so based on the type of that name.

Polypodium lycopodioides var. *subdimorphum* Christ in Dur. & Pitt. Bull. Soc. Bot. Belgique 35, Mém. 233. 1896. TYPE: Alto del Roble, Pcia. Heredia, 1700 m, *Pittier 11* in 1888 (G-Hb. Boissier not seen).

Phymatodes prominula Maxon, Contr. U. S. Natl. Herb. 10:501. 1908. TYPE: S. Juan trail, Isla de Margarita, Edo. Nueva Esparta, Venezuela, 500 m, *Johnston 155* (US).

Polypodium lycopodioides var. *longipes* Hassl. Trab. Inst. Bot. Farm. Buenos Aires 45:78. 1928. TYPE: Cordillera Central, Paraguay, *Hassler 6733* (G not seen).

Polypodium lycopodioides var. *longipes* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]:137. 1929, non Hassl., 1928, nom. illeg. TYPE: Near Barahona, Hispaniola, *von Tuerckheim 2736* (PRC? not seen).

Polypodium lycopodioides f. *obtusum* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]:137. 1929, as “*obtusum*.” TYPE: Trinidad, *Fendler 50* in 1877–1880 (PRC? not seen; isotype US).

Polypodium lycopodioides var. *stipitatum* Bosco, Nuovo Giorn. Bot. Ital. N.S., 45:151. 1938. TYPE: Plan de Sapote, Pcia. Santiago-Zamora, Ecuador, 2100 m, *Crespi* (TO not seen).

Plants epiphytic, at 0–2500 m elevation, in forests, from throughout the wetter portions of Costa Rica, Panama, and the Chocó. Also from Puerto Rico, Mexico to Honduras, Nicaragua, Trinidad, Tobago, and tropical South America.

Gómez (Brenesia 6:50–51, f. 3. 1975) has found a hybrid apparently between this species and *Polypodium fuscopetiolatum*, which he has named *M. moraviana*.

360. *Microgramma nitida* (J. Smith ex Hook.) A. R. Smith, Proc. Calif. Acad. Sci. IV, 40:230. 1975.

Phlebodium nitidum J. Smith, Bot. Mag. (Curtis) 72, Comp.:13. 1846. NEOTYPE: “*Collect. Hort. Kew, 1851*,” in the hand of J. Smith (BM not seen), chosen by A. R. Smith (Fl. Chiapas 2:149. 1981).

Polypodium palmeri Maxon, Contr. U. S. Natl. Herb. 17:600. 1916. TYPE: Near Gómez Fárias, Edo. Tamaulipas, Mexico, ca. 350 m, *Palmer 308* (US; isotype UC).

Plants epiphytic, at 0–100 m elevation, in forests, from the Atlantic coastal plain of Costa Rica near Limón (Pcia. Limón), the Canal Zone, and adjacent Pcia. Colón. Also from Jamaica, Barbados, Mexico to Honduras, and Nicaragua.

361. *Microgramma persicariifolia* (Schrad.) K. Presl, Tent. Pterid. 214. 1836.

Polypodium persicariifolium Schrad. Goett. Gel. Anz. 1824:867. 1824. TYPE: Brazil, *Maxmillian von Wied-Neuwied* (M not seen).

Plants epiphytic, at 0–100 m elevation, in forests, from the Com. S. Blas, the Pcia. del Darién, and throughout the Chocó. Also from Venezuela, Colombia, Peru, Bolivia, Guyana, Surinam, and Brazil.

362. *Microgramma reptans* (Cav.) A. R. Smith, Proc. Calif. Acad. Sci. IV, 40:230. 1975.

Acrostichum reptans Cav. Anales Hist. Nat. 1:104. 1799. TYPE: Guayaquil, Pcia. Guayas, Ecuador, *Née* (MA not seen). Synonymized by Christensen (Dansk Bot. Ark. 9(3):9. 1937).

Polypodium ciliatum Willd. Sp. Pl. ed. 4, 5:144. 1810. TYPE: Est. Pará, Brazil, *Hoffmannsegg* (B-Hb. Willd. 19601 not seen Tryon photo).

Polypodium cajanense Desv. Ges. Naturf. Freunde Berlin Mag. 5:314. 1811. TYPE: French Guiana, collector unknown (P-Hb. Desv. not seen; isotype FI not seen photo 16022).

Craspedaria lanceolata Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:65. 1854. TYPE: Surinam, *Hostmann* 324 (RB not seen).

Polypodium piloselloides var. *moniliforme* Hook. Sp. Fil. 5:34. 1863, as “*moniliformis*.” TYPE: Not stated.

Plants epiphytic, at 0–200(1000) m elevation, in forests, from the Atlantic coastal plain of Costa Rica and Panama, Golfito (Pcia. Puntarenas) and the Peninsula de Osa, the Canal Zone, Cana, and the Chocó. Also from Mexico to Honduras, Nicaragua, Trinidad, Tobago, and tropical South America.

363. *Microgramma tecta* var. *nana* (Liebm.) Mickel & Beitel, Pterid. Fl. Oaxaca 251. 1988.

Acrostichum nanum Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd., V, 1:171 (repr. 19). 1849. TYPE: Between S. Miguel Coatlán and La Galera, Edo. Oaxaca, 7000–8000 ft, *Liebmann Pl. Mex. 2655, Fl. Mex. 36* (C not seen).

Polypodium blandulum Christ. Bull. Herb. Boissier II, 7:259. 1907. TYPE: Río Grande, Pcia. S. José, 600 m, *Wercklé* in 1906 (P not seen).

Plants epiphytic, at 0–1300 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Finca La Selva (Pcia. Heredia), the Meseta Central, the vicinity of S. Isidro del General, and the Peninsula de Osa. Also from Mexico, Honduras, Venezuela to Bolivia and adjacent Brazil, and Surinam.

This differs from *M. tecta* (Kaulf.) Alston var. *tecta* of southeastern Brazil in having narrower, hairlike scales on the abaxial surface of the fertile laminae.

49. NEURODIUM Fée

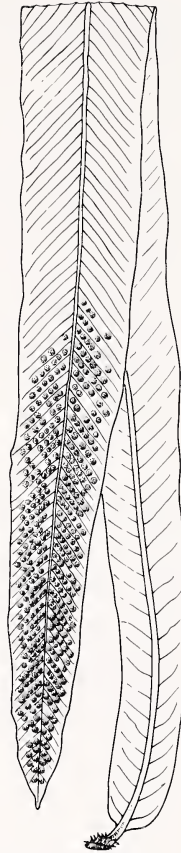
Plants epiphytic; rhizomes short-creeping, bearing copious roots provided with dark brown root hairs, scaly, the scales lanceolate, strongly clathrate, bicolorous, toothed, the pale margins worn away in age; stipes short, subterete, blackish, articulate to the rhizome, slightly alate at the apex; fronds medium-sized, simple, subdimorphic (the fertile fronds contracted laterally at and proximal to the apex); laminae narrowly rhombic, coriaceous, shiny, glabrous, the adaxial surface wrinkled when dry, the midribs greenish abaxially; veins irregularly anastomosing with simple or branched and recurved included veinlets; sori in a continuous, submarginal coenosorus, partially protected by the reflexed lamina margin, exindusiate; paraphyses highly branched filaments; sporangia long-stalked.

Caribbean; monotypic.

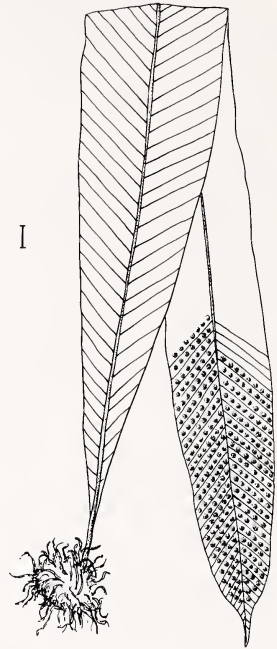


364 *Neurodium lanceolatum*

365 *D. panamense*



367 *Niphidium nidulare*



366 *Niphidium crassifolium*



368 *H. anetioides*

CHRISTENSEN, C. 1929. Taxonomic fern-studies I. Revision of the polypodioid genera with longitudinal coenosori... Dansk Bot. Ark. 6(3):1–102, t. I–XIII.

364. *Neurodium lanceolatum* (L.) Fée, Hist. Vittar. Pleurogr. [Mém. Foug. 3]:28. 1852.

Pteris lanceolata L. Sp. Pl. 2:1073. 1753. TYPE: Plate 40 of Plumier's "Description...", which depicts a plant collected by Plumier on Hispaniola.

Plants epiphytic, at 0–100 m elevation, at forest margins, along roadsides, and in pastures, from the slopes of Volcán Sta. María, the Río Flores, and near Guayabo (all Pcia. Guanacaste). Also from Florida, the Antilles, Mexico to Honduras, and French Guiana.

50. DICRANOGLOSSUM J. Smith

Plants epiphytic; rhizomes short-creeping, bearing copious roots provided with brown root hairs, scaly, the scales lanceolate, strongly clathrate, bicolorous, the margins worn away in age; stipes articulate to the rhizome, obsolete, narrowly alate to the base; fronds medium-sized, monomorphic; laminae oblanceolate in outline, pseudodichotomously forked a few times, attenuate at the base, the segments long, narrow and attenuate at the apex, herbaceous, glabrous or bearing small, lanceolate scales abaxially, the midribs prominulous abaxially; veins obscure, simple, forked, or anastomosing without included veinlets; sori in a continuous or discontinuous submarginal coenosorus or discrete, partially protected by the reflexed lamina margin, exindusiate; paraphyses absent; sporangia long-stalked.

Neotropical; 6 species.

CHRISTENSEN, C. 1929. Taxonomic fern-studies I. Revision of the polypodioid genera with longitudinal coenosori... Dansk Bot. Ark. 6(3):1–102, t. I–XIII.

365. *Dicranoglossum panamense* (C. Chr.) Gómez, Brenesia 8:46. 1976.

Eschatogramme panamensis C. Chr. Dansk Bot. Ark. 6(3):37. 1929. TYPE: Around the Agua Clara Reservoir near Gatun, Canal Zone, *Maxon 4642* (US; isotype NY).

Plants epiphytic, at 0–200(900) m elevation, in forests and occasionally plantations, from the Atlantic and Pacific coastal plains of Costa Rica and Panama, the valley of the Río General, and throughout eastern Panama and the Chocó. Also from Honduras, Nicaragua, and Colombia to Peru.

51. NIPHIDIUM J. Smith

Plants epiphytic or rarely epipetric or terrestrial; rhizomes short-creeping or sometimes long-creeping, the younger portions bearing copious roots provided with brown root hairs, scaly, the scales lanceolate-acuminate, concolorous to sharply bicolorous, the margins often worn away in age; stipes short, articulate to the rhizome or to phyllopodia, scaly at the base; fronds medium-sized to large, simple, monomorphic; laminae narrowly elliptic-lanceolate to oblong, attenuate at the base, round, acute, or acuminate at the apex, coriaceous, glabrous, or with a few scales on the abaxial surface of the midrib, often glaucous, with usually

FIGS. 364–368. *Neurodium*, *Dicranoglossum*, *Niphidium*, and *Hyalotrichopteris*. FIG. 364. Plant of *Neurodium lanceolatum*, Johnson 1038, Guatemala. FIG. 365. Plant of *D. panamense*, Mickel 3474. FIG. 366. Plant of *N. crassifolium*, Biolley 40. FIG. 367. Plant of *N. nidulare*, Torres R. 42. FIG. 368. Plant of *H. anetioides*, Skutch 2753.

conspicuous hydathodes; principal side veins prominulous, ascending, the secondary veins immersed, forming inconspicuous, irregular, transverse areolae with numerous minor areolae containing numerous free veinlets; sori in 1 row between the main veins, exindusiate; sporangiasters sometimes numerous; sporangia long-stalked, the capsules sometimes setose.

Neotropical; 10 species.

LELLINGER, D. B. 1972. A revision of the fern genus *Niphidium*. *Amer. Fern J.* 62:101–120.

1. Rhizome scales grayish in mass, entire or slightly repand, sometimes slightly erose in age, the cells mostly isodiametric or fusiform, not contorted, those of the central band (2)3–5 times longer than wide. Laminae narrowly oblanceolate, sometimes narrowly lanceolate, attenuate or acuminate at the base, acute to round and sometimes cuspidate at the apex, (30)45–80(105) cm long, 6–11(18) cm wide, with brown hydathodes on the adaxial surface; paraphyses common among the sporangia.

366. *N. crassifolium*

1. Rhizome scales blackish in mass, shallowly toothed, the cells mostly isodiametric, slightly contorted, those of the central band 1.5–3 times longer than wide. Laminae narrowly lanceolate, attenuate, obtuse, or round at the base, acute at the apex, (25)55–105 cm long, 3–6.5(9) cm wide, with inconspicuous hydathodes on the adaxial surface; paraphyses rare among the sporangia.

367. *N. nidulare*

366. *Niphidium crassifolium* (L.) Lellinger, *Amer. Fern J.* 62:106. 1972.

Polypodium crassifolium L. *Sp. Pl.* 2:1083. 1753. LECTOTYPE: Plate 6, f. 1 of Petiver's "Pterigraphia Americana," chosen by Lellinger (*Amer. Fern J.* 62:106. 1972).

Polypodium porrectum Willd. *Sp. Pl. ed. 4*, 5:161. 1810. TYPE: Caracas, Distr. Fed., Venezuela, Bredemeyer (B-Hb. Willd. 19622 not seen Tryon photo fragm US; isotype W).

Polypodium coriaceum Raddi, *Opusc. Sci.* 3:286. 1819; *Pl. Bras. Nov. Gen.* 1:16, t. 25. 1825, non Swartz, 1788, nom. illeg. TYPE: Corco-secco, Est. Rio de Janciro, Brazil, Raddi (FI, labelled "Polyp: coriaceum nob: e Brasilia").

Pleuridium angustum Fée, *Mém. Soc. Sci. Hist. Nat. Strasbourg* 5 [Mém. Foug. 8]:98. 1857. TYPE: "Province d'Ocaña," Depto. Norte de Santander, Colombia, ca. 2400 m, Schlim 610 (BR; isotypes HB, L, W).

Plants epiphytic, occasionally epipetric or terrestrial, at 0–1600 m elevation, in forests, from throughout the Flora area. Also from throughout tropical America.

367. *Niphidium nidulare* (Rosenst.) Lellinger, *Amer. Fern J.* 62:112. 1972.

Polypodium crassifolium var. *nidulare* Rosenst. *Repert. Spec. Nov. Regni Veg.* 22:18. 1925. TYPE: La Palma, Pcia. S. José, 1400 m, Brade & Brade 113 (*Ros. Fil. Costar. Exs.* 300) (S photos 5969, 20635; isotypes B, NY, UC, US).

Plants epiphytic, at 1300–2000 m elevation, in forests, from Monteverde, Zarcero (Pcia. Alajuela), La Palma (Pcia. S. José), and La Fortuna and Estrella (Pcia. Cartago).

52. HYALOTRICHOPTERIS W. H. Wagner

Plants epipetric; rhizomes creeping, branched, densely scaly, the scales lanceolate, strongly clathrate, concolorous; stipes obsolete; fronds small or minute, monomorphic, not articulate; laminae spatulate, herbaceous, sparsely hairy, the hairs pluricellular, filiform, with a short basal cell also bearing a short glandular cell; veins anastomosing, forming 1(2) rows of roundish, polygonal areolae, with short, free veins near the margin and a single included veinlet in each areola; hydathodes present on the adaxial surface of the lamina; sori round, exindusiate; paraphyses present; sporangia long-stalked.

Nicaragua and Costa Rica; monotypic.

WAGNER, W. H., Jr. and D. R. FARRAR. 1977. The Central American fern genus *Hyalotricha* and its family relationships. *Syst. Bot.* 1:348–362.

368. *Hyalotrichopteris anetioides* (Christ) Wagner, *Taxon* 27:548. 1978.

Polypodium anetioides Christ, *Bull. Soc. Bot. Genève* II, 1:219. 1909. TYPE: Candelaria Mountains, Pcia. S. José, 1450 m, *Brade & Brade 177 (Ros. Fil. Costar. Exs. 88)* (P not seen; isotypes GH, MICH? not seen, NY, S not seen photo 5941, UC).

Plants epipetric, at 1000–2000 m elevation, on cliffs in dense forests, from the Fila de Cedral, Orosi (Pcia. Cartago), and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Nicaragua.

53. CAMPYLONEURUM K. Presl

Plants epiphytic or occasionally epipetric or terrestrial; rhizomes short-creeping and robust to long-creeping and wiry, often glaucous, bearing rather few, long roots without conspicuous root hairs, scaly especially at the apex, the scales peltate-lanceolate, sometimes clathrate, usually brownish; fronds small to large, monomorphic; stipes short to sometimes long, articulate to the rhizome or to short phyllopodia, scaly at the base; laminae simple (pinnate in a few species), oblong to elliptic, herbaceous to coriaceous, glabrous or with a few scales on the abaxial surface of the midrib, often shiny, with usually conspicuous hydathodes; principal side veins parallel, prominulous in most species, ascending, the secondary veins immersed or not, forming rather regular, transverse areolae, sometimes with 2(3 or more) minor areolae usually containing a single, unbranched included veinlet, or parallel side veins absent and the veins uniform and anastomosing with 1 or 2 sori in each fertile areola; sori (1)2 in major areolae, usually forming double rows between the main veins, exindusiate; paraphyses absent; sporangia long-stalked.

Neotropical; ca. 50 species.

LELLINGER, D. B. 1988. Some new species of *Campyloneurum* and a provisional key to the genus. *Amer. Fern J.* 78:14–35.

1. Rhizomes compact to short-creeping, rarely long-creeping, 3–10 mm in diam.; stipes 0.2–1(2) cm distant..6.

1. Rhizomes very long-creeping, 1–2(3) mm in diam.; stipes usually 1–4 cm distant..2.

2(1). Fertile areolae unisoriolate with the fertile veins not branching from the midpoint of the transverse vein, occasionally bisoriolate. Rhizome scales lanceolate, entire, clathrate with narrow lumina; stipes 1–5.5 cm long, 0.25–0.75 mm in diam.; laminae linear-lanceolate, 6–16 cm long, 5–18 mm wide, acute to cuneate at the base, acuminate at the apex; sori in 2 or 3 series on each side of the midrib.

374. *C. falcoideum*

2(1). Fertile areolae 2(3)-soriolate..3.

3(2). Adaxial surface of the laminae very shiny; laminae elliptic, 2–3 times longer than wide; fronds 5–20(25) cm long. Rhizome scales lanceolate, 3–5 mm long, with slightly toothed margins, golden brown, spreading; stipes 2–10 cm long, 0.25–1 mm in diam.; laminae elliptic, 3.5–15 cm long, 1.5–5.5 cm wide, acuminate at the base and apex; sori in 4–6 series on each side of the midrib.

382. *C. sublucidum*

3(2). Adaxial surface of the laminae dull; laminae linear to long-elliptic, at least 3 times longer than wide; fronds 12–50 cm long..4.

4(3). Stipes 1–3 cm long; laminae elliptic-oblong, (2)2.5–3.5(5) cm wide, acuminate at the base. Stipes 1–1.5 mm in diam.; sori in 4–5(6) series on each side of the midrib.

381. *C. serpentinum*

4(3). Stipes 2–12(18) cm long; laminae elliptic to elliptic-oblong, (2)3–8(11) cm wide, acute to attenuate at the base..5.

5(4). Stipes (3)4–12(18) cm long; laminae acute, cuneate, or attenuate at the base, (1)2–3(6) times longer than the stipes, coriaceous. Stipes ca. 1 mm wide; laminae elliptic-lanceolate, elliptic-oblong, or elliptic, 10–30(40) cm long, (1.5)2–8(11.5) cm wide, acuminate to caudate at the apex; sori in 4–8(15) series on each side of the midrib.

383. *C. wercklei*

5(4). Stipes 2–5(7) cm long; laminae cuneate to attenuate at the base, (4)6–8(12) times longer than the stipes, papyraceous. Stipes ca. 1 mm wide; laminae elliptic-oblong, (12)15–40(50) cm long, (2.5)4–8.5 cm wide, acute to acuminate at the apex; sori in 4–13 series on each side of the midrib.

380. *C. repens*

6(1). Laminae not linear, more than 3 cm wide..10.

6(1). Laminae linear or nearly so, less than 3(4.5) cm wide..7.

7(6). Rhizome scale cells predominantly 2–4 times longer than wide..9.

7(6). Rhizome scale cells predominantly 1–2 times longer than wide..8.

8(7). Cells of the rhizome scales at least in part contorted. Stipes 2–4 cm long, 1–1.5 mm wide distal to the base; laminae linear, 10–30 cm long, (3)8–10(14) cm wide, slightly revolute, attenuate at the base and apex; venation mostly obscure abaxially; sori in 1(2) series on each side of the midrib.

374a. *C. irregularis*

8(7). Cells of the rhizome scales not contorted. Stipes 1–5 cm long, 1–1.5 mm wide distal to the base; laminae linear, 30–45 cm long, 9–18 mm wide, often revolute, attenuate at the base and apex; venation mostly obscure abaxially; sori in (1)2 series on each side of the midrib.

372. *C. cooperi*

9(7). Stipes 1–1.5(2) mm in diam. near the base, 0–5(7) cm long; laminae (0.5)1–2.5 cm wide; sori usually less than 2 mm in diam. Laminae linear, (10)20–45(60) cm long, attenuate at the base and apex; venation usually entirely obscure abaxially; sori in 1–3 series on each side of the midrib.

370. *C. angustifolium*

9(7). Stipes 2–4(5) mm in diam. near the base, (5)10–15(20) cm long; laminae (1)2.5–4(5) cm wide; sori usually more than 2 mm in diam. Laminae linear, 15–45(60) cm long, cuneate to long-attenuate at the base, acuminate to attenuate at the apex; venation usually visible, often prominulous; sori in 2–3(4) series on each side of the midrib.

369. *C. amphostenon*

10(6). Laminae pinnate. Stipes 0.3–1(1.5) m long; laminae ovate-lanceolate, ca. 0.5–1(1.5) m long, 40–80 cm wide; pinnae elliptic-lanceolate, 20–40 cm long, 6–10 cm wide, usually with 3 alternate, lateral pinna pairs plus a conform terminal pinna.

376. *C. magnificum*

10(6). Laminae simple..11.

11(10). Primary and transverse veins all hidden; stipes 1–2 cm long, 1–2 mm in diam.; laminae narrowly oblanceolate. Laminae (6)10–30(35) cm long, 1.5–5 cm wide, attenuate at the base, apiculate at the apex; transverse veins arcuate with 2 included, acroscopic veinlets; sori in 3–5 series on each side of the midrib.

378. *C. occultum*

11(10). Primary and transverse veins mostly visible (transverse veins mostly obscure in *C. costatum* and *xalapense*); stipes (1)2–30 cm long, 1.5–4 mm in diam.; laminae not narrowly oblanceolate..12.

12(11). Fertile transverse veins always with only 2 free, acroscopic, included veinlets, both of them fertile. Laminae 30–45 cm long, 9–13 cm wide, elliptic, acute-attenuate at the base, apiculate at the apex; sori in ca. 12 series on each side of the midrib.

371. *C. brevifolium*

12(11). Fertile transverse veins with 3 or more free, acroscopic, included veinlets or the venation irregular..13.

13(12). Transverse veins mostly visible on the abaxial surface..15.

13(12). Transverse veins mostly not visible on the abaxial surface..14.

14(13). Stipes 1–4(5) cm long; laminae usually with obvious lime dots on the adaxial surface. Laminae oblong, 15–40(45) cm long, 2–4(5.5) cm wide, attenuate at the base, apiculate at the apex.

384. *C. xalapense*

14(13). Stipes (2)4–14 cm long; laminae lacking lime dots on the adaxial surface. Laminae oblong-elliptic, 15–30(35) cm long, 2–6 cm wide, attenuate to cuneate at the base, apiculate at the apex.

373. *C. costatum*

15(13). Laminae 2–5(6.5) cm wide..17.

15(13). Laminae 5–14 cm wide..16.

16(15). Venation regular, the fertile transverse veins usually with 3 free, acroscopic, included veinlets, the lateral 2 fertile, the middle one sterile and prolonged, sometimes forming a pair of areolae; sori in 2(3) regular rows between the lateral veins. Stipes 6–14(23) cm long; laminae narrowly elliptic to oblong, (20)35–75 cm long, 5–11 cm wide, cuneate at the base, round to acute at the apex; midrib scales dark brown, up to 1.5 mm long, deciduous; lateral veins 5–6 mm distant.

379. *C. phyllitidis*

16(15). Venation irregular with the primary areolae usually divided by several irregular veinlets not parallel to the primary veins; sori in 2–4 irregular rows between the primary veins. Stipes 10–23 cm long; laminae oblong, (30)45–90 cm long, 6–14 cm wide, cuneate at the base, acute to subapiculate at the apex; midrib scales pale brown, 1–3 mm long, subpersistent; primary veins (4)5–10 mm distant.

375. *C. latum*

17(15). Laminae dull, plane and entire at the margin; stipes 4–15 cm long; rhizomes ca. 5 mm in diam. Laminae linear to oblong, 30–50 cm long, 3–5(6.5) cm wide, attenuate at the base, acute at the apex, with weak lime dots on the adaxial surface; primary veins 4–5 mm distant.

377. *C. multipunctatum*

17(15). Laminae shiny, somewhat wrinkled and irregularly crenate at the margin; stipes 1–4(5) cm long; rhizomes ca. 3 mm in diam. Laminae oblong, 15–40(45) cm long, 2–4(5.5) cm wide, apiculate at the apex, with obvious lime dots on the adaxial surface; primary veins 5–6 mm distant.

384. *C. xalapense*

369. *Campyloneurum amphostenon* (Kunze ex Klotzsch) Fée, Gen. Fil. [Mém. Foug. 5]:258. 1852.

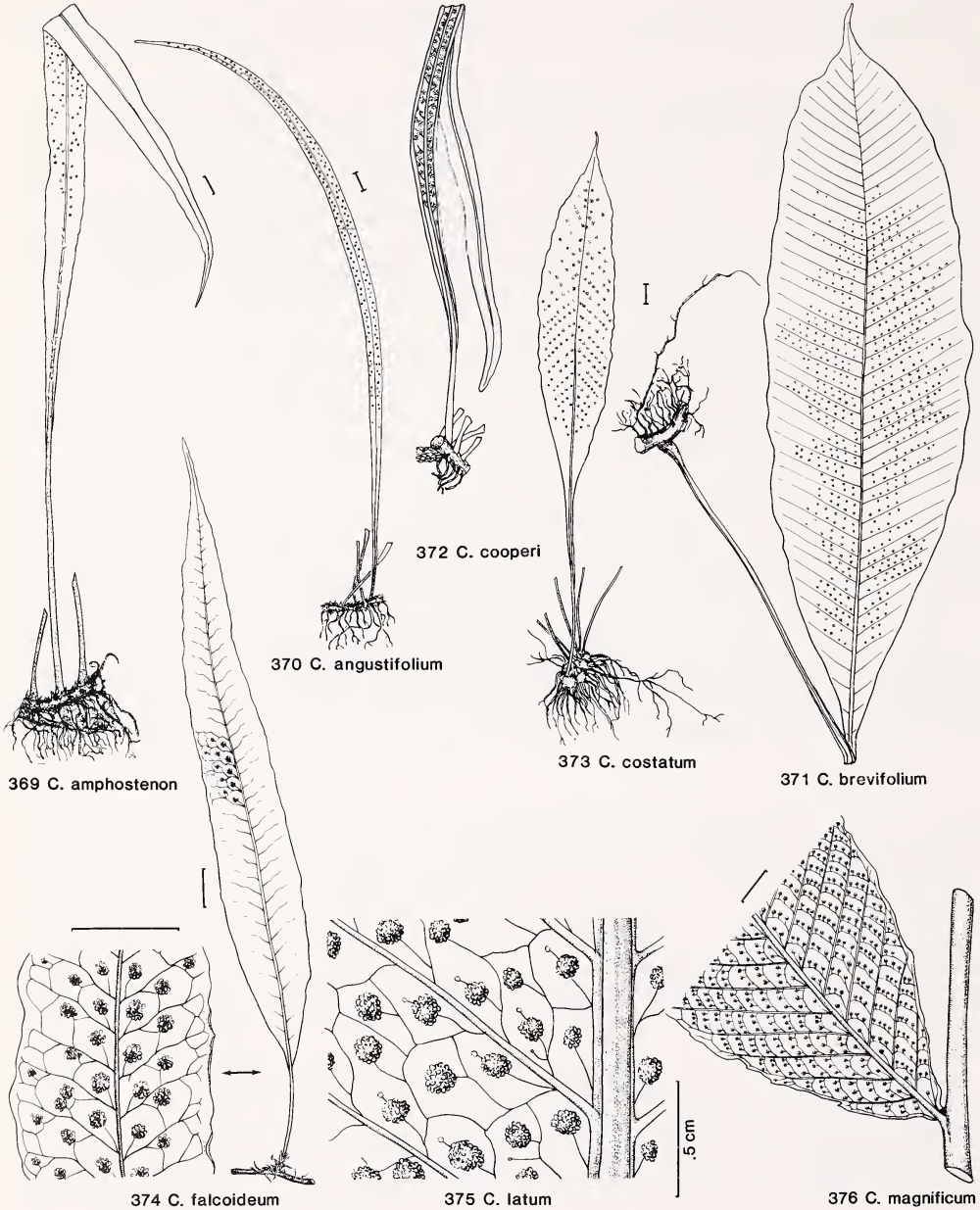
?*Polypodium dimorphum* Link, Hort. Reg. Bot. Berol. 2:88. 1833. TYPE: Not stated; presumably a specimen collected by Link from a plant cultivated at the Botanical Garden in Berlin, originally from tropical America (B? not seen).

Polypodium amphostenon Kunze ex Klotzsch, Linnaea 20:399. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz 120b* (B not seen; isotype BM not seen fragm and Maxon photo 121 US, K not seen).

Polypodium angustifolium var. *monstrosum* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:258 (repr. 340). 1864, as “*monstrosa*.” TYPE: Cipacón, Depto. Cundinamarca, Colombia, 2800 m, *Lindig 241* (B not seen; isotype US).

Polypodium pittieri Christ in Pitt. Prim. Fl. Costaric. 3(1):16. 1901. TYPE: El Páramo toward the east of Cerro Buena Vista, Pcia. S. José, 3000 m, *Pittier 10479* (BR; isotypes BM not seen photo GH, US).

Plants epiphytic or terrestrial, at 2000–3100 m elevation, in forests and in open areas, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Cuba, Jamaica, Hispaniola, Mexico, Guatemala, Venezuela, and Colombia to Bolivia.



370. *Campyloneurum angustifolium* (Swartz) Fée, Gen. Fil. [Mém. Foug. 5]:257. 1852.

Polypodium angustifolium Swartz, Nov. Gen. Sp. Pl. Prodr. 130. 1788. TYPE: Jamaica, Swartz (S not seen Maxon photo 101; isotypes B-Hb. Willd. 19611-2 not seen Tryon photo, BM not seen photo 6729).

?*Polypodium calaguala* Ruiz, Mem. Calaguala c. tab. 1805. Reference not seen; copy at G.

Polypodium crassifolium f. *angustissimum* Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:45. 1912, as “*angustissima*.” TYPE: Above Facatativa, Savane de Bogotá, Depto. Cundinamarca, Colombia, 2600 m, Mayor 40 (S not seen; isotype US).

Plants epiphytic, at (100)500–3300 m elevation, in forests, pastures, and on roadsides, from the Cordillera de Tilarán, the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito, near Sta. Fé, near El Valle, and the upper Río Truando (Depto. Chocó). Also throughout tropical America.

371. *Campyloneurum brevifolium* (Lodd. ex Link) Link, Fil. Sp. 124. 1841.

Polypodium brevifolium Lodd. ex Link, Hort. Reg. Bot. Berol. 2:90. 1833. TYPE: Origin unknown; cultivated by Loddiges, collector unknown (B? not seen).

Polypodium caespitosum Lodd. ex Link, Hort. Reg. Bot. Berol. 2:91. 1833. TYPE: Origin unknown; cultivated by Loddiges, collector unknown (B? not seen).

Plants epiphytic or terrestrial, at 600–1400 m elevation, in forests, from the Reventazón and Navarro valleys (both Pcia. Cartago), the Fila Costeña near S. Vito, the vicinity of Boquete, and Cana and the Serranía del Darién between Cerro Mali and the Río Pucro (Pcia. Darién). Also from Venezuela, Colombia, and Peru.

372. *Campyloneurum cooperi* Lellinger, Amer. Fern J. 78:19, f. 3, 9. 1988.

TYPE: Cartago, Pcia. Cartago, 4250 ft, *Cooper 6053* (US; isotype US).

Plants epiphytic, at 900–1300 m elevation, in forests, known only from the type and from Turrialba, Pcia. Cartago (*Wercklé*, US).

373. *Campyloneurum costatum* (Kunze) K. Presl, Tent. Pterid. 190. 1836.

Polypodium costatum Kunze, Linnaea 9:38. 1834. TYPE: Limonar, Cuba, Aug 1822, *Poeppig* (LZ destroyed; isotypes BM not seen, K not seen, L not seen photo 1853).

Campyloneurum immersum J. Smith in Seem. Bot. Voy. Herald 231. 1854. TYPE: Bay of Utria, Depto. Chocó, *Seemann 61* (K not seen Maxon photo 246).

Plants epiphytic, at 0–200 m elevation, in forests, from the Atlantic coastal plain of Panama, near El Valle, and the Canal Zone and adjacent Pcia. Panama. Also from Florida, Cuba, Jamaica, Hispaniola, Puerto Rico, Mexico to Belize, Nicaragua; Colombia and Venezuela to Trinidad, the Guianas, and central Brazil.

This species resembles *C. occultum* in having partially obscure venation, but differs from that species in having longer stipes and in lacking minute hairs on the abaxial surface of the laminae.

FIGS. 369–376. *Campyloneurum*. FIG. 369. Plant of *C. amphostenon*, Evans & Lellinger 92. FIG. 370. Plant of *C. angustifolium*, Lankester 647. FIG. 371. Plant of *C. brevifolium*, Mickel 2105. FIG. 372. Plant of *C. cooperi*, Wercklé. FIG. 373. Plant of *C. costatum*, Maxon 4872. FIG. 374. Plant and portion of lamina of *C. falcoideum*, Stork 4841 and Seibert 284. FIG. 375. Plant and portion of lamina of *C. latum*, Cook & Doyle 287. FIG. 376. Base of median pinna of *C. magnificum*, Cuatrecasas 13667, Colombia.

374. *Campyloneurum falcoideum* (Kuhn ex Hieron.) M. Meyer ex Lellinger, Proc. Biol. Soc. Wash. 89:708. 1977.

Polypodium falcoideum Kuhn ex Hieron. Bot. Jahrb. Syst. 34:533. 1904. SYNTYPES: Río Sucio, Costa Rica, 800 m, *Lehmann 1741* (B not seen; isosyntype US); and near Desengaño, Pcia. Heredia?, *Wendland 876* (B not seen).

?*Polypodium rodriguezianum* Gómez, Revista Biol. Trop. 17:107, f. 5–6. 1970. TYPE: Cerro Carpintera, Pcia. Cartago, 1800 m, *Gómez PtC-2063* (CR not seen).

Plants epiphytic, at 0–2000 m elevation, in forests, from the Atlantic plain of Costa Rica, the Cordillera Central, Cerro Tablazo, Cerro Carpintera, and the Cordillera de Talamanca to Pcia. Chiriquí.

An earlier epithet may be available from *Polypodium schnittspahnii* Christ (Bull. Herb. Boissier 6:836. 1898), which is based on “Andes, *Moritz?*” (presumably P not seen).

374a. *Campyloneurum irregulare* Lellinger, Amer. Fern J. 78:24, f. 6, 12. 1988.

TYPE: Vicinity of Quito, Pcia. Pichincha, Ecuador, 3000 m, *Holdridge 1580* (US).

Plants epiphytic or occasionally epipetric, at 800–1500 and 3200–3300 m elevation, in forests, from near S. Ramón, Angel Falls (Pcia. Alajuela), Cartago, and the Cordillera de Talamanca, especially in Pcia. Chiriquí. Also from Venezuela and Colombia to Bolivia.

This species resembles *C. angustifolium* in lamina size and shape, but differs in having rhizome scales with contorted cells.

375. *Campyloneurum latum* T. Moore, Ind. Fil. 225. 1861.

?*Campyloneurum moritzianum* Fée, Gen. Fil. [Mém. Foug. 5]:258. 1852. TYPE: Caracas, Distr. Fed., Venezuela, *Moritz 3* (RB not seen).

LECTOTYPE: St. Vincent, *Guilding* (K not seen), chosen by Proctor (Fl. Less. Antill. 342. 1977).

Plants epiphytic, at 0–1400 m elevation, in forests, from the Cordillera Central, the Atlantic coastal plain of Costa Rica and Panama, the Cordillera de Talamanca to Pcia. Chiriquí, around El Valle and Penonomé (both Pcia. Coclé), Chagres (Canal Zone), the Río Fató (Pcia. Colón), and Loma del Cuchillo and Andagoya (both Depto. Chocó). Also throughout tropical America except the Guianas.

The epithet *moritzianum* will displace the well-known epithet *latum* if the two species prove to be synonymous.

376. *Campyloneurum magnificum* T. Moore, Ind. Fil. 226. 1861.

Polypodium fendleri D. C. Eaton, Mem. Amer. Acad. Arts N.S., 8:199. 1860, non *Campyloneurum fendleri* Moore, 1861. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Fendler 410* (YU not seen; isotypes E? not seen, MO).

TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Fendler 410* (E? not seen; isotypes MO, YU not seen).

Plants terrestrial or hemiepiphytic, at 800–1200 m elevation, in forests, in the Flora area known only from the headwaters of the Río Tuquesa ca. 2 km from the continental divide, Pcia. Darién (*Croat 27143*, MO), and from near the Ciudad Bolívar–Quibdó road at ca. Km. 139, Depto. Chocó (*Lellinger & de la Sota 916*, LP, US). Also from Venezuela and Colombia to Bolivia.

377. *Campyloneurum multipunctatum* (Christ) Lellinger, Proc. Biol. Soc. Wash. 89:708. 1977.

Polypodium phyllitidis var. *elongatum* Hieron. Bot. Jahrb. Syst. 34:534. 1904, as "*elongata*." SYNTYPES: Río Paez, Depto. Tolima, Colombia, 800–1300 m, *Lehmann* 5721 (B not seen; isosyntype US); and Cerro Yanghuan near Pindilic, Cordillera Oriental de Cuenca, Pcia. Azuay, Ecuador, 2500–2800 m, *Lehmann* 7679 (B not seen; isosyntypes GH, US).

Polypodium phyllitidis f. *multipunctatum* Christ, Bull. Herb. Boissier II, 5:7. 1905. TYPE: Costa Rica, *Wercklé* 174 (P not seen).

Plants epiphytic, at 600–1300 m elevation, in forests, from the Cordillera Central and Tuis (Pcia. Cartago). Also from Colombia and Ecuador.

378. *Campyloneurum occultum* (Christ) Gómez, Brenesia 8:46. 1976.

Polypodium occultum Christ, Bull. Herb. Boissier II, 5:7. 1905. TYPE: Río de las Vueltas, Tucurrique, Pcia. Cartago, 365 m, *Tonduz* 12756 (P not seen photo BM not seen). *Tonduz* 12752 (US) is also this species from the same locality, and actually may be the type number if the published number is in error.

Polypodium trichiatum Rosenst. Repert. Spec. Nov. Regni Veg. 7:148. 1909. TYPE: Cordillera Occidental near Riobamba, Pcia. Chimborazo, Ecuador, 600 m, *Rimbach* 87 (S not seen photo 6089).

Plants epiphytic or rarely epipetric, at 0–600(900) m elevation, in forests, from the Cordillera de Tilarán, the Atlantic coastal plain of Costa Rica, the valley of the Río Reventazón, near Sta. Fé, the Canal Zone and adjacent Pcia. Colón and Pcia. Panama, near Cana, and near Bahía Solano and Acandí (Depto. Chocó). Also from Belize, Nicaragua, Colombia, Peru, Bolivia, and Brazil.

379. *Campyloneurum phyllitidis* (L.) K. Presl, Tent. Pterid. 190. 1836.

Polypodium phyllitidis L. Sp. Pl. 2:1083. 1753. TYPE: Plate 38 of Plumier's "Description...", which illustrates a plant from the Antilles.

Polypodium comosum L. Sp. Pl. 2:1084. 1753. TYPE: Plate 131 of Plumier's "Traité...", which illustrates a plant collected by Plumier on Hispaniola.

Polypodium simplicifolium Salisb. Prodr. Stirp. Chap. Allerton 403. 1796, nom. superfl. TYPE: A renaming of *P. phyllitidis* L., and so based on the type of that name.

Polypodium conjugatum Poir. Encyc. Méth. 5:516. 1804. TYPE: West Indies, *Houston* in 1732 (P-Hb. Juss. Cat. 1071 not seen photo 2934).

?*Polypodium parallelinerve* Desv. Mém. Soc. Linn. Paris 6:230. 1827. TYPE LOCALITY: "Habitat in ins. Africanis?" presumably in error.

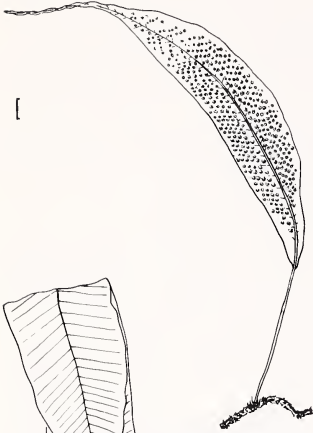
Polypodium gladiatum Vell. Fl. Flumin. 11:t. 59. 1831; Arq. Mus. Nac. Rio de Janeiro 5:445. 1881, non Kunze, 1834, nom. illeg. TYPE LOCALITY: Brazil.

Plants epiphytic, at 0–700 m elevation, in forests, from near S. Ramón, the Cordillera Central, the Atlantic coastal plain of Costa Rica and Panama, the Meseta Central, the Cordillera de Talamanca to Pcia. Chiriquí, near Guaniquito (Pcia. Los Santos), La Mesa del Valle (Pcia. Coclé), the Canal Zone and adjacent Pcia. Panama, near Cana, and the northern half of the Chocó. Also throughout tropical America.

The cross veins are sometimes rather hidden in this species on the abaxial surface of the laminae, as in *C. costatum*, but the laminae are relatively wider and taper more abruptly at the base than in *C. costatum*.

380. *Campyloneurum repens* (Aubl.) K. Presl, Tent. Pterid. 189. 1836.

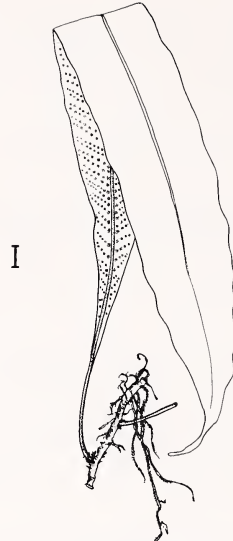
Polypodium repens Aubl. Hist. Pl. Guiane 2:962. 1775. TYPE: Plate 134 of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique.



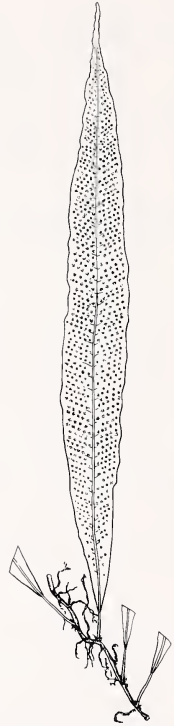
383 *C. wercklei*



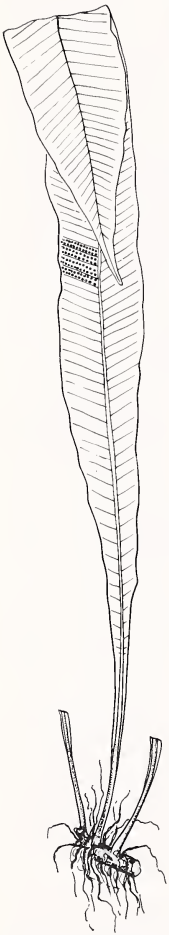
378 *C. occultum*



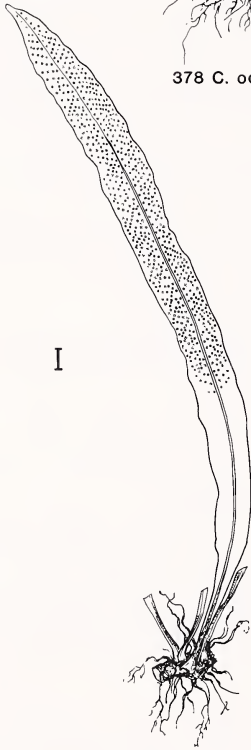
380 *C. repens*



381 *C. serpentinum*



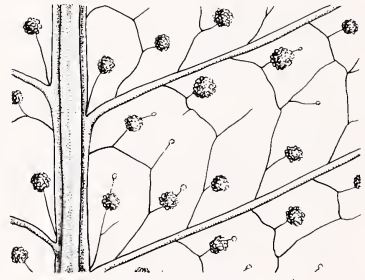
377 *C. multipunctatum*



384 *C. xalapense*



382 *C. sublucidum*



379 *C. phyllitidis*

?*Polypodium nitidum* Kaulf. Enum. Fil. 92. 1824. TYPE: Ilha Sta. Catarina, Est. Sta. Catarina, Brazil, *Chamisso* (LE not seen).

?*Polypodium crispum* Fée, Gen. Fil. [Mém. Foug. 5]:259. 1852. TYPE: Brazil, *Martius 303* (P or RB not seen).

Plants epiphytic, at 0–900(1600) m elevation, in forests, from the Atlantic and Pacific coastal plains of Costa Rica, the Cordillera Central, the Fila Costeña near S. Vito, near Puerto Armuelles (Pcia. Chiriquí), Loma Prieta (Pcia. Los Santos), the vicinity of El Valle, the Canal Zone and adjacent Pcia. Panama, Cana and Paca (Pcia. Darién), and throughout the Chocó. Also from Jamaica, Puerto Rico, the Lesser Antilles, Mexico, Guatemala to Honduras, Nicaragua, Venezuela, Colombia to Bolivia, the Guianas, and Brazil.

381. *Campyloneurum serpentinum* (Christ) Ching, *Sunyatsenia* 5:263. 1940.

Polypodium serpentinum Christ, Bull. Herb. Boissier II, 6:51. 1906. TYPE: Navarro, Pcia. Cartago, *Wercklé* (P not seen).

Plants epiphytic, at 0–1700 m elevation, in forests, from near S. Ramón, the Cordillera Central, the Meseta Central, the Reventazón and Navarro valleys (Pcia. Cartago), the Cordillera de Talamanca to Pcia. Chiriquí, near El Valle, Masargantí and vicinity (Com. S. Blas), Cerro Pirre and between Paya and Palo de Las Letras (Pcia. Darién), and Loma del Cuchillo and La Teresita (both Depto. Chocó). Also from Mexico, and Venezuela to Peru.

382. *Campyloneurum sublucidum* (Christ) Ching, *Sunyatsenia* 5:263. 1940.

Polypodium sublucidum Christ, Bull. Herb. Boissier II, 7:261. 1907. TYPE: La Palma, Pcia. S. José, 1500 m, *Wercklé 17051* (P not seen).

Plants epiphytic or epipetric, at 900–1400 m elevation, in forests, from La Hondura (Pcia. S. José), Orosí and near Pejivalle (both Pcia. Cartago), and between Cana and the Alturas de Nique (Pcia. Darién).

383. *Campyloneurum wercklei* (Christ) Lellinger, *Amer. Fern J.* 78:28. 1988.

Polypodium wercklei Christ, Bull. Herb. Boissier II, 5:7. 1905. SYNTYPES: Costa Rica, *Wercklé* (P not seen); and Río Sucio, Costa Rica, 800 m, *Lehmann 1741* (P not seen; isosyntype US).

Plants epiphytic, at 100–2000(2400) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Atlantic coastal plain of Costa Rica and adjacent Panama, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito, El Valle, and the Pacific coastal plain of southern Costa Rica. Also from Ecuador.

384. *Campyloneurum xalapense* Fée, Gen. Fil. [Mém. Foug. 5]:258. 1852.

Campyloneurum caudatum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:96. 1857, non Raddi, 1819, nom. illeg. TYPE: Córdoba and Huatusco, Edo. Veracruz, Mexico, *Schaffner 176* (RB? not seen; isotype K not seen), synonymized by A. R. Smith (Fl. Chiapas 2:68. 1981).

Polypodium weatherbyanum F. Seym. Phytologia 31:171. 1975. TYPE: A renaming of *Campyloneurum caudatum*, and so based on the type of that name.

FIGS. 377–384. *Campyloneurum*. FIG. 377. Plant of *C. multipunctatum*, Tonduz 14223. FIG. 378. Plant of *C. occultum*, Killip 2659. FIG. 379. Portion of lamina of *C. phyllitidis*, Williams 1028. FIG. 380. Plant of *C. repens*, Kennedy 1924. FIG. 381. Plant of *C. serpentinum*, Maxon 665. FIG. 382. Plant of *C. sublucidum*, Standley & Valerio 47108. FIG. 383. Plant of *C. wercklei*, Lellinger 1393. FIG. 384. Plant of *C. xalapense*, Wercklé.

TYPE: Jalapa, Edo. Veracruz, Mexico, *Galeotti* 6723 (P or RB not seen fragm ex K at NY).

Plants epiphytic, at 500–1200 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Meseta Central, the Navarro valley (Pcia. Cartago), the Fila Costeña, and Barro Colorado Island (Canal Zone). Also from Mexico to El Salvador.

54. PHLEBODIUM (R. Br.) J. Smith

Plants epiphytic or epipetric; rhizomes creeping, thick, often knotted, densely scaly, the scales lanceolate, usually reddish-brown, ciliate-toothed; stipes rather thick, articulate to short phyllopodia, scaly at the base; fronds medium-sized to large, monomorphic; laminae ovate to oblong, pinnatisect or pinnatifid with a broadly alate rachis, herbaceous to subcoriaceous, glabrous, often glaucous; veins anastomosing in polygonal areolae, generally lacking included veinlets, except the fertile areolae with an included polygonal areola bearing a sorus distally; sori small, round, exindusiate, lacking paraphyses; sporangia long-stalked.

Neotropical; ca. 4 species.

1. Sori in 1(2) rows on each side of the segment midrib; laminae slightly to copiously glaucous on the abaxial surface; veins forming a relatively uniform network of areolae, without prominent primary lateral veins; rhizomes with their scales ca. 1 cm in diam.

385. *P. pseudoaureum*

1. Sori in 3–6 rows on each side of the segment midrib; laminae not or only slightly glaucous on the abaxial surface; primary lateral veins prominent, with less prominent, arcuate secondary veins forming areolae; rhizomes with their scales ca. 2 cm in diam.

386. *P. decumanum*

385. *Phlebodium pseudoaureum* (Cav.) Lellinger, Amer. Fern J. 77:101. 1988.

Polypodium pseudoaureum Cav. Descr. Pl. 247. 1801. TYPE: Without locality, *Née* (MA not seen), examined by Christensen (Dansk Bot. Ark. 9(3):12. 1937).

Polypodium sporadocarpum Willd. Sp. Pl. ed. 4, 5:171. 1810, nom. superfl. TYPE: A renaming of *Polypodium pseudoaureum* Cav., and so based on the type of that name.

Polypodium areolatum Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:172. 1810. TYPE: Cumaná, Edo. Sucre, Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 19645 not seen mfc. S. I. Library).

Polypodium pulvinatum Link, Hort. Reg. Bot. Berol. 2:99. 1833. TYPE: Cultivated in the Botanical Garden at Berlin, originally from Brazil, *Link* (B not seen).

Chrysopteris trilobata Fée, Gen. Fil. [Mém. Foug. 5]:266. 1852. TYPE: South America, *Pamplin* (P or RB not seen).

Chrysopteris grandis Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:96. 1857. TYPE: Ocaña, Depto. Norte de Santander, Colombia, *Schlim* 598 (P or RB not seen).

Chrysopteris lanosa Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:97. 1857. TYPE: S. Angel, Mexico, *Schaffner* 311 (P or RB not seen).

Chrysopteris microdictya Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:97. 1857. TYPE: Near Orizaba, Edo. Veracruz, Mexico, *Schaffner* 203 (RB not seen).

Polypodium auratum Vellozo, Fl. Flumin. 11:t. 74. 1831; Arq. Mus. Nac. Rio de Janeiro 5:448. 1881. TYPE: Plate 74, illustrating material collected around Rio de Janeiro, Brazil, by Vellozo.

Polypodium areolatum var. *loreum* Bomm. in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 219. 1896. SYNTYPES: Río Virilla, La Uruca, Pcia. S. José, 1100 m, *Pittier* 8017 (BR not seen), *Biolley* 131 (BR not seen); S. Francisco de Guadalupe, Pcia. S. José, *Tonduz* 99 (BR not seen); and Pico Piedra Blanca, west of Volcán Irazú, Pcia. S. José, *Tonduz* 418bis (BR not seen).

Polypodium aureum var. *reductum* Jenm. Bull. Bot. Dept. Jamaica N.S., 4:138. 1897. TYPE: Not stated; probably Jamaica, *Jenman* (NY? not seen).

Plants epiphytic, at 100–2300(2600) m elevation, in forests and pastures, from the Cordillera de Tilarán, the Atlantic coastal plain of Costa Rica, the Cordillera Central, the Meseta Central, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, and the vicinity of Cana. Also from Florida, the Antilles, Mexico to Nicaragua, Venezuela to Bolivia, Brazil, the Guianas, and Argentina.

386. *Phlebodium decumanum* (Willd.) J. Smith, J. Bot. (Hooker) 4:59. 1841.

Polypodium decumanum Willd. Sp. Pl. ed. 4, 5:170. 1810. TYPE: Brazil, Hoffmannsegg (B-Hb. Willd. 19640 not seen microfiche S. I. Library).

Chrysopteris dictyocallis Fée, Gen. Fil. [Mém. Foug. 5]:265. 1852. TYPE: French Guiana, Poiteau (P not seen).

Phlebodium multiseriale T. Moore & Houlst. Gard. Chron. 1855:469. 1855. TYPE: Not stated; from cultivated material.

Plants epiphytic, at 0–200 m elevation, in forests, from Tortuguero (Pcia. Limón), near Unguía and the Parque Natural Nacional Los Catiós (both Depto. Chocó). Also from Jamaica, Hispaniola, Puerto Rico, the Lesser Antilles, Trinidad, Mexico to Honduras, and tropical South America.

Hybrids of this species with *P. pseudoaureum* have been reported from Tortuguero, Pcia. Limón, by L. D. Gómez (pers. comm.).

55. POLYPODIUM L.

Plants epiphytic, sometimes epipetric or rarely terrestrial; rhizomes creeping, scaly, the scales concolorous or bicolorous, usually not more than weakly clathrate, mostly tan or brownish; stipes relatively long, thin, articulate to low phyllopodia, mostly scaly at the base, otherwise glabrous, a few (with the rachises) pilosulous; fronds small to large, monomorphic or rarely subdimorphic with the fertile laminae somewhat contracted; laminae pinnatisect or pinnate, rarely simple or decomposed, mostly oblong to lanceolate, glabrous or scaly, rarely pilosulous; veins simple, forked, or pinnate, mostly or entirely free (subg. *Polypodium* and *Marginaria*) or regularly anastomosing, with primary lateral veins and secondary transverse veins forming areolae each bearing a single, unbranched, excurrent veinlet (subg. *Goniophlebium* and *Marginaria*); sori surficial, lateral to terminal on a free veinlet, round or rarely elongate, exindusiate; paraphyses filamentous or absent; sporangia long-stalked.

Cosmopolitan; ca. 100 species.

EVANS, A. M. 1969. Interspecific relationships in the *Polypodium pectinatum*–*plumula* complex. Ann. Missouri Bot. Gard. 55:193–293.

MAXON, W. R. 1916. Studies of tropical American ferns—No. 6. Contr. U. S. Natl. Herb. 17:541–608.

SOTA, E. R. de la 1966. Revisión de las especies Argentinas del grupo “*Polypodium squamatum*” L. “Polypodiaceae” (s. str.). Revista Mus. La Plata, Secc. Bot. 10:69–186, t. I–VII.

1. Laminae sparsely to densely scaly throughout the abaxial surface (subg. *Marginaria*)..22.

1. Laminae glabrous or pubescent on the abaxial surface, occasionally scaly only the the abaxial surface of the rachis and other axes..2.

2(1). Veins free and forked or occasionally anastomosing in a single, irregular series (subg. *Polypodium*)..40.

2(1). Veins regularly anastomosing in 1–several series, the areolae with a single free, included veinlet (subg. *Goniophlebium*)..3.

3(2). Laminae simple, not lobed. Sori in 2 or often more rows on either side of the midrib, usually glaucous on the abaxial surface, oblong or narrowly ovate-lanceolate, obtuse to acute at the base,

8–23 cm long, (3)4–6 cm wide, the midribs with ovate scales abaxially; rhizome scales orbiculate, deciduous.

394. *P. laevigatum*

3(2). Laminæ pinnatifid to pinnate..4.

4(3). Sori elongate, usually 1.5–2 times longer than wide. Rhizomes compact, their scales linear, reddish-brown; laminæ narrowly to broadly lanceolate or elliptic-lanceolate, 40–100(120) cm long, 20–35(50) cm wide, with 30–50 or more pairs of segments; rachises lacking a dark brown abaxial stripe.

398. *P. plectolepidioides*

4(3). Sori round or nearly so..5.

5(4). Laminæ pinnatifid with all the segments broad at the base and fully adnate to the rachis..11.

5(4). Laminæ pinnate with at least the proximal pinnae short-petiolulate to sessile, tapered at the base, and not adnate..6.

6(5). Distal pinnae short-petiolulate to sessile, not adnate..9.

6(5). Distal pinnae adnate, not short-petiolulate to sessile..7.

7(6). Sori in 1 row on each side of the costa; proximal pinnae obtuse to truncate at the base. Laminæ ovate-lanceolate, 10–40 cm long, 8–25 cm wide; rhizome scales linear-lanceolate, ca. 1 cm long, 1 mm wide, thin, clathrate with large, clear lumina.

401. *P. sessilifolium*

7(6). Sori in 2–6 rows on each side of the costa, sometimes partially in 1 row on subfertile laminæ; proximal pinnae cuneate to acute at the base..8.

8(7). Sori in 2 or 3 rows on each side of the costa; rhizomes short-creeping; rhizome scales spreading, with pale margins absent or nearly so; pinnae (1)2–3 cm wide. Laminæ ovate-lanceolate, 15–50(75) cm long, 20–50(70) cm wide; pinnae 3–10(15) pairs.

403. *P. triseriale*

8(7). Sori in 4–6(10) rows on each side of the costa; rhizomes long-creeping; rhizome scales appressed to the rhizome, with broad, pale margins; pinnae (3)4–6 cm wide. Laminæ ovate-lanceolate, 30–75 cm long, 25–40 cm wide; pinnae 4–10 pairs.

391. *P. giganteum*

9(6). Sori in 1 or 2 rows on each side of the costa; proximal pinnae cordate at the base, the auricles imbricate and overlapping the rachis. Laminæ ovate-lanceolate, ca. 50 cm long, 30 cm wide; pinnae ca. 10 subopposite, linear-lanceolate, falcate-ascending pairs, the terminal pinna slightly longer than the subtending lateral ones.

393. *P. kunzeanum*

9(6). Sori in 3–6(10) rows on each side of the costa; proximal pinnae acute at the base..10.

10(9). Sori in 3–5 rows on each side of the costa; pinnae 1–2.5(3.5) cm wide. Laminæ long-lanceolate to oblong, 20–60(75) cm long, 12–30 cm wide; pinnae (1)4–16(19) linear-lanceolate to oblong pairs.

389. *P. fraxinifolium*

10(9). Sori in 4–6(10) rows on each side of the costa; pinnae (3)4–6 cm wide. Laminæ ovate-lanceolate, 30–75 cm long, 25–40 cm wide; pinnae 4–10 pairs.

391. *P. giganteum*

11(5). Laminæ truncate or only slightly tapered at the base (with a few basal auricles in *P. wagneri*, with puberulent rachises); stipes exalate..13.

11(5). Laminæ abruptly tapered at the base, the basal segments reduced to auricles; stipes partially or entirely alate..12.

12(11). Laminæ slightly pilose on the abaxial surface of the veins, glabrous on the adaxial surface; segments slightly and irregularly crenate, the lateral margins usually not parallel, the apices usually acute. Laminæ linear, 25–40 cm long, 5–7(9) cm wide.

396. *P. loriciforme*

12(11). Laminae rather densely pilose on the veins on both surfaces; segments entire, the lateral margins mostly parallel, the apices usually round. Laminae linear, 15–40 cm long, 3–7(8) cm wide.

402. *P. subviride*

13(11). Rhizome scales spreading, linear to lanceolate, usually persistent..16.

13(11). Rhizome scales appressed, lanceolate to orbiculate, often deciduous and leaving a blackish scar..14.

14(13). Sori in (1)2 rows on each side of the costa; segments usually round at the apex. Laminae linear-lanceolate or lanceate, (15)30–70 cm long, (6)9–22 cm wide, the segments not or only slightly falcate.

397. *P. maritimum*

14(13). Sori in 1 row on each side of the costa; segments usually acute at the apex..15.

15(14). Rhizomes (1)1.5–2.5 mm in diam.; laminae lanceate to triangular, 6–24 cm long, 4–12 cm wide, with 10–22 non-falcate pairs of segments.

399. *P. ptilorhizon*

15(14). Rhizomes 3–5 mm in diam.; laminae lanceate, 20–45 cm long, 12–26 cm wide, with 20–35 pairs of usually falcate segments.

395. *P. loriceum*

16(13). Sori in 2 or 3 rows on each side of the costa. Laminae (10)25–40(100) cm long, 5–20(25) cm wide, with 15–30(33) pairs of segments, the bases cordate; costae, veins, and laminae pilose on both surfaces.

387. *P. dissimile*

16(13). Sori in 1 row on each side of the costa..17.

17(16). Rhizome scales dark brown to black and clathrate at least at the center, weakly to strongly bicolorous..20.

17(16). Rhizome scales stramineous to reddish-brown throughout, not clathrate, concolorous..18.

18(17). Laminae 1–1.5 times longer than wide; segments usually 1.5–3 times their width distant, 4–7(10) pairs per pinna. Laminae oblong to broadly ovate, (10)15–30(45) cm long, (8)12–30 cm wide.

388. *P. flagellare*

18(17). Laminae 2–4 times longer than wide; segments usually 0.5–1(1.5) times their width distant, (8)15–30 pairs per pinna..19.

19(18). Proximal pinnae somewhat contracted distal to the base; stipes and rachises usually with a dark brown abaxial stripe; rhizome scales narrowly lanceolate to acicular with a dark central area at the base. Laminae lanceate, (5)8–30(45) cm long, (4)7–16 cm wide, with (5)8–15(30) pairs of segments.

390. *P. fuscopetiolatum*

19(18). Proximal pinnae not contracted distal to the base; stipes and rachises lacking a dark brown abaxial stripe, the rachises often reddish; rhizome scales broadly ovate-lanceolate without a dark central area at the base. Laminae lanceate, (7)12–32 cm long, (3.5)7–13(16) cm wide, with (8)15–33 pairs of segments.

400. *P. rhodopleuron*

20(17). Laminae at least 20 cm wide; pinnae at least (11)15 mm wide. Laminae ovate-lanceolate, (15)25–65(115) cm long, 20–30(42) cm wide.

392. *P. kuhnii*

20(17). Laminae no more than 10(16) cm wide; pinnae no more than 8(10) mm wide..21

21(20). Rhizome scales nearly linear distal to their expanded base, bicolorous, reddish-brown nearly throughout to blackish at the center and pale along the margins; costae and laminae usually sparsely to densely pilosulous on both surfaces. Laminae linear, (12)25–45(55) cm long, (2)3.5–7(14) cm wide.

404. *P. wagneri*

21(20). Rhizome scales broadly lanceolate, concolorous, blackish throughout; costae and laminae glabrous on both surfaces. Laminae lanceate, (7)10–30(50) cm long, (3)5–15(21) cm wide.

405. *P. wiesbaueri*

22(1). Laminae pinnatifid or pinnatisect, the segments entire..28.

22(1). Laminae pinnate-pinnatifid or more divided, the segments or pinnae lobed. Veins free..23.

23(22). Rhizomes 0.5–1 mm in diam., very long-creeping; fronds 2–6 cm long. Laminae pinnate-pinnatifid, ovate-lanceolate, 1–3.5 cm long, 1–2 cm wide, the ultimate segments 0.5–1 mm wide; rhizome scales ca. 0.5 mm long, bearing a few hairs on their surface.

410. *P. fallax*

23(22). Rhizomes 2–5 mm in diam., creeping; fronds 6–40 cm long..24.

24(23). Pinna lobes all short except the basal ones. Lobes usually 2–3(4) mm wide; rhizome scales ca. 3–5 mm long, 0.75 mm wide, bicolorous with a dark, sharply defined median stripe, clathrate, the cells large; laminae lanceate, 5–18(22) cm long, 3–10 cm wide, the pinna lobes few and short on small specimens.

416. *P. murorum*

24(23). Pinna lobes mostly long, the basal ones often shorter than the median ones..25.

25(24). Laminae pinnate-pinnatifid, the lobes usually ca. 1 mm wide..27.

25(24). Laminae very deeply pinnate-pinnatifid or 2-pinnate to quadripinnatisect, the lobes usually 0.5–2 mm wide; rhizome scales ca. 4 mm long, 1 mm wide, concolorous, not clathrate, the cells minute..26.

26(25). Laminae 2-pinnate-pinnatifid to quadripinnatisect; ultimate segments ca. 0.5 mm wide, not lobed toward the apex; pinnae petiolulate (the stalks 2–5 mm long). Laminae lanceolate to linear-lanceate, 9–25(40) cm long, (2)4–6(10) cm wide.

411. *P. friedrichsthalianum*

26(25). Laminae pinnate-pinnatifid to 2-pinnate; ultimate segments 1–2 mm wide, conspicuously lobed toward the apex; pinnae subsessile (the stalks 0.5–2 mm long). Laminae linear-lanceate, 10–25(28) cm long, (2.5)3.5–7 cm wide.

413. *P. lindenianum*

27(25). Pinnae up to 15 pairs; rhizome scales slightly bicolorous, the central area brown; laminae triangular. Laminae 7–15 cm long, (3)4–7(10) cm wide.

406. *P. ×aspidiolepis*

27(25). Pinnae 35–45 pairs; rhizome scales concolorous, reddish-stramineous throughout; laminae narrowly triangular. Laminae 9–15 cm long, 1.5–5 cm wide.

418. *P. ×pinnatisectum*

28(22). Laminae truncate or abrupt at the base..30.

28(22). Laminae long-attenuate at the base. Veins anastomosing..29.

29(28). Scales on the adaxial surface of the laminae 1.5–2.5 mm long, narrowly lanceate from a short-stellate base; rhizome scales 3–8 mm long. Laminae nearly linear, attenuate at the base and apex, 12–26 cm long, 1.6–3.5 cm wide, densely covered on the abaxial surface with reddish, very narrowly lanceolate scales with ciliate bases.

408. *P. bombycinum*

29(28). Scales on the adaxial surface of the laminae up to 1 mm long, orbiculate-stellate or with one 1 acicular ray; rhizome scales less than 3 mm long. Laminae nearly linear, attenuate at the base and apex, 15–21 cm long, ca. 3.5 cm wide, densely covered on the abaxial surface with reddish, broadly ovate-lanceolate, long-ciliate scales.

407. *P. balaonense*

30(28). Rhizome scales 1.5–3 mm long, lanceolate or with an expanded base and a long-acuminate to sub-acicular apex, spreading (except appressed in *P. montigenum*)..32.

30(28). Rhizome scales 0.25–1 mm long, roundish to triangular-ovate, very closely appressed to the rhizome..31.

31(30). Rhizomes 2.5–3.5 mm in diam.; scales on the adaxial surface of the lamina orbiculate and ca. 0.5 mm in diam. or with a short, linear-lanceolate ray and ca. 0.2 mm long. Laminae linear, truncate at the base, acute at the apex, 10–40(55) cm long, 4–9(10) cm wide, with 25–40 pairs of lateral segments.

417. *P. myriolepis*

31(30). Rhizomes 4–7 mm in diam.; scales on the adaxial surface of the lamina linear-lanceolate with an expanded base, ca. 1 mm long. Laminae oblong, truncate at the base, acute to obtuse at the apex, 20–35 cm long, 9–22 cm wide, with 13–32 pairs of lateral segments.

409. *P. collinsii*

32(30). Laminae mostly or entirely covered on the abaxial surface with orbiculate to lanceolate scales, the latter with an expanded base; rhizome scales sharply bicolorous, the central stripe black or dark brown, the margins pale, repand-crested (except concolorous and whitish in *P. furfuraceum*); small sinuses absent along the lamina margins..35.

32(30). Laminae subglabrous on the abaxial surface with lanceate scales; rhizome scales concolorous or partially or entirely bicolorous with plane, ciliate margins; small sinuses present along the lamina margins..33.

33(32). Rhizomes very long-creeping, 2–3 mm in diam.; stipes 2–5 cm distant; rhizome scales appressed. Laminae (11)15–30 cm long, (5)10–14(18) cm wide, ovate-lanceolate to oblong.

415. *P. montigenum*

33(32). Rhizomes creeping, (2)3–5(10) mm in diam.; stipes 0.2–4 cm distant; rhizome scales spreading..34.

34(33). Stipes 2–4 cm distant; laminae subdimorphic, oblong to triangular, the fertile ones narrower and longer than the sterile ones; laminae (2)2.5–3(4) times longer than wide, with 9–18(20) pairs of lateral segments, the fertile ones narrower than the sterile ones, obtuse to round at the apex. Laminae 8–35 cm long, (3)4–11(13) cm wide.

423. *P. remotum*

34(33). Stipes 0.5–3 cm distant; laminae monomorphic, ovate-lanceolate or rarely oblong; laminae 1.5–2.5(3) times longer than wide, with (12)16–24 pairs of lateral segments, the fertile and sterile ones equally wide, usually acute to acuminate at the apex. Laminae 8–20(25) cm long, 4–8(12) cm wide.

419. *P. plebeium*

35(32). Stipes mostly longer than the rachises. Rhizomes long-creeping; laminae broadly triangular, 2–13 cm long, 2–8 cm wide, densely covered on the abaxial surface with lanceolate, toothed-ciliate scales; pinnae 3–10 mm wide, 2–9 lateral pairs per frond; veins anastomosing.

424. *P. thyssanolepis*

35(32). Stipes mostly shorter than or equalling the rachises..36.

36(35). Rhizomes 3–5 mm in diam.; rhizome scales concolorous or weakly bicolorous, without a blackish central stripe..39.

36(35). Rhizomes 1–1.5 mm in diam.; rhizome scales strongly bicolorous, with pale margins and a blackish central stripe. Rhizomes long-creeping; laminae narrowly triangular to linear, (2)3–10(13) cm long, 1–3.5(5) cm wide; pinnae 1–3 mm wide, (4)9–15 lateral pairs per frond; veins anastomosing..37.

37(36). Larger scales of the abaxial lamina surface (but not the margins) acicular from an orbiculate, expanded, entire to erose base, the apical portion entire to remotely toothed.

420. *P. polypodioides* var. *aciculare*

37(36). Larger scales of the abaxial lamina surface (but not the margins) lanceolate with an acute to acuminate apex, the base not expanded, the apical portion subentire, erose-toothed, or densely fimbriate-ciliate..38.

38(37). Larger scales of the abaxial lamina surface (but not the margins) entire or erose-toothed in the apical region.

421. *P. polypodioides* var. *michauxianum*

38(37). Larger scales of the abaxial lamina surface (but not the margins) strongly fimbriate-ciliate.

422. *P. polypodioides* var. *polypodioides*

39(36). Scales of the abaxial lamina surface usually lanceolate, strongly toothed, at least 0.5 mm wide, whitish with a sharply defined, black or brown center; rhizomes short-creeping and knotted, the stipes approximate; rhizome scales concolorous, very pale reddish-brown, broadly lanceolate with an acuminate apex, entire or weakly erose at the margin. Laminae linear or narrowly triangular, 10–30(40) cm long, 2–6(9) cm wide; sori superficial; veins free.

412. *P. furfuraceum*

39(36). Scales of the abaxial lamina surface usually orbiculate, ciliate to entire, mostly ca. 0.3 mm wide, pale brown with a poorly defined, dark brown center; rhizomes long-creeping, the stipes 1–6 cm distant; rhizome scales reddish-brown, weakly bicolorous, linear-lanceolate with an attenuate apex, sparsely ciliate at the margin. Laminae oblong, (10)12–30(35) cm long, (3.5)5–10 cm wide; sori deeply sunken; veins anastomosing.

414. *P. macrolepis*

40(2). Pinnae acute to attenuate at the base. Laminae 15–25 cm long, 12–20 cm wide, oblong-lanceolate; pinnae 5–10(15) pairs; sori medial, usually oval.

426. *P. fraternum*

40(2). Pinnae obtuse to truncate at the base or adnate to the rachis..41.

41(40). Laminae distantly serrate; sori submedial, round; rhizome scales linear distal to the expanded base, somewhat revolute, the margins toothed. Laminae broadly lanceolate, 15–45 cm long, 10–35 cm wide; pinnae (8)14–24 pairs; sori submedial.

425. *P. echinolepis*

41(40). Laminae entire or irregularly and shallowly crenate; sori usually medial or supra-medial and slightly elongate; rhizome scales lanceolate, entire..42.

42(41). Pinnae or segments 6–10 mm wide, 20–30(40) pairs per frond; rachises puberulous, the hairs up to 0.2(0.5) mm long. Laminae (10)15–45(55) cm long, (6)7–13(15) cm wide, narrowly lanceolate, (2)3–4 times longer than wide; sori up to 1.5 mm long, 1.25 mm wide.

428. *P. ursipes*

42(41). Pinnae or segments 10–25 mm wide, 10–15(20) pairs per frond; rachises glabrous or sparsely hairy, the hairs 0.2–0.5 mm long. Laminae (10)15–40(50) cm long, 8–20(25) cm wide, lanceolate, 1.5–2.5(3) times longer than wide; sori up to 2 mm long, 1 mm wide.

427. *P. sororium*

POLYPODIUM subg. GONIOPHLEBIUM (Blume) C. Chr.

387. *Polypodium dissimile* L. Syst. Nat. ed. 10, 2:1325. 1759.

Polypodium chnoodes Spreng. Neue Entdeck. 3:6. 1822. TYPE: Martinique, Kohaut (Sieber Exs.) (LZ destroyed).

Polypodium retrofractum Desv. Mém. Soc. Linn. Paris 6:237. 1827. TYPE: "Habitat in America calidiori," collector unknown (P not seen), examined by Weatherby (Contr. Gray Herb. 114:32. 1936).

Polypodium chnoodes var. *minus* Christ, Bull. Herb. Boissier II, 6:49. 1906. TYPE: Navarro, Pcia. Cartago, Wercklé (P not seen).

TYPE: Jamaica, Browne (LINN 1251.24 not seen microfiche S. I. Library).

Plants epiphytic, at 500–1500 m elevation, in forests, from west of Tilarán (Pcia. Guanacaste), the Cordillera Central, the Atlantic coastal plain of Costa Rica, the Reventazón and Orosi valleys (Pcia. Cartago), the Río General valley, the Fila Costeña near S. Vito, the Fortuna Reservoir site (Pcia. Chiriquí), near Sta. Fé, above Cana, and La Esperanza on the Río Calima (Depto. El Valle). Also from the Antilles, Mexico, Guatemala, Honduras, Nicaragua, Trinidad, Venezuela, and Colombia.

388. *Polypodium flagellare* Christ in Bomm. & Christ, Bull. Herb. Boissier 4:660. 1896.

Goniophlebium patens J. Smith, Bot. Voy. Herald 230. 1854, non *Polypodium patens* Swartz, 1788. TYPE: Hacienda de Madre, Panama, *Seemann* (BM not seen).

TYPE: S. Mateo, Plain of Surubres, Pcia. Puntarenas, *Biolley* 2671 (BR not seen photo 4989; isotypes CR, US).

Plants epiphytic, at 0–700 m elevation, in forests, from near Surubres (Pcia. Puntarenas), S. Luis de Turrubares (Pcia. S. José), around El Valle, near Guaniquito (Pcia. Los Santos), and the Canal Zone and adjacent Pcia. Panama.

389. *Polypodium fraxinifolium* Jacq. Collectanea 3:187. 1791.

Polypodium rhizocaulon Willd. Sp. Pl. ed. 4, 5:196. 1810. TYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer* (B-Hb. Willd. 19690 not seen Tryon photo).

Polypodium distans Raddi, Pl. Bras. Nov. Gen. 1:21, t. 31. 1825, non Kaulf., 1824, nom. illeg. TYPE: Brazil, *Raddi* (FI not seen).

Polypodium polystichum Link, Hort. Reg. Bot. Berol. 2:101. 1833. TYPE: Cultivated in the botanical garden at Berlin, originally from Brazil, *Link* (B not seen).

Polypodium mutabile Kunze, Linnaea 9:46. 1834. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz* 351 (B not seen).

Polypodium cymatodes Kunze, Linnaea 23:277, 317. 1850. SYNTYPES: Cultivated in the botanical gardens at Leipzig and Berlin, originally from Venezuela, *Kunze* (LZ destroyed).

Goniophlebium deflexum T. Moore & Houlst. Gard. Mag. Bot. 3:61. 1851. TYPE: Cultivated in the garden at Kew, originally from Brazil, *collector unknown* (K? not seen).

Polypodium fluminense Vell. Fl. Flumin. 11:t. 66. 1831; Arq. Mus. Nac. Rio de Janeiro 5:447. 1881. TYPE: Plate 66, which illustrates a plant collected from the region of Rio de Janeiro by Vellozo.

Polypodium fraxinifolium var. *fraxinellum* Christ, Bull. Herb. Boissier II, 5:5. 1905. TYPE: Costa Rica, *Wercklé & Brune* (P not seen).

TYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer?* (BM? not seen). The ample illustration supplied by Jacquin (Icon. Pl. Rar. t. 637. 1793) makes it likely that the type was collected by Bredemeyer, rather than by Jacquin himself, for Stafleu (Tax. Lit. 1:230. 1967) noted that Jacquin's own material is scrappy.

Plants epiphytic, at (200)500–2100 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central and adjacent Atlantic lowlands of Costa Rica, the Cordillera de Talamanca to Pcia. Chiriquí, between Cerro Pilon and El Valle, Cerro Campana (Pcia. Panama), the Alturas de Nique (Pcia. Darién), and Pico Mali, Alto del Buey, and the Río El Salto (all Depto. Chocó). Also from Guatemala, Nicaragua, Trinidad, Venezuela, Colombia to Bolivia, and Brazil.

Polypodium scutulatum Sodiro (Sert. Fl. Ecuad. 2:29. 1908) is a closely allied species. A possible hybrid between *P. fraxinifolium* and *P. triseriale* is known from near Boquete, Pcia. Chiriquí (*Killip* 5171, *Cornman* 928, both US).

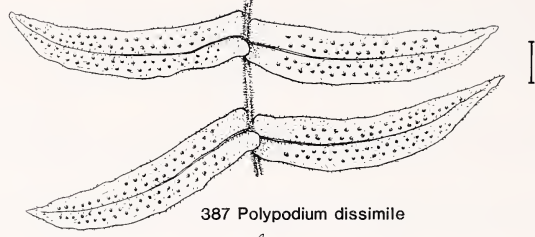
390. *Polypodium fuscopetiolatum* A. R. Smith, Amer. Fern J. 70:24, f. 13–15. 1980.

TYPE: 6–8 km west-northwest of Soyalo, Edo. Chiapas, Mexico, *Breedlove* 37155 (DS not seen).

Plants epiphytic or epipetric, at 800–1800 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Meseta Central, the Fila de Cedral, east of Copey (Pcia. S. José), the Fila Costeña near S. Vito, and Cerro



390 *Polypodium fuscopetiolatum*



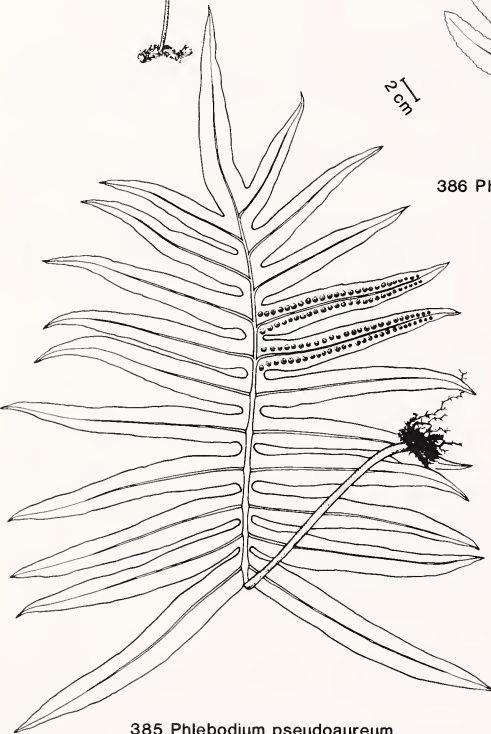
387 *Polypodium dissimile*



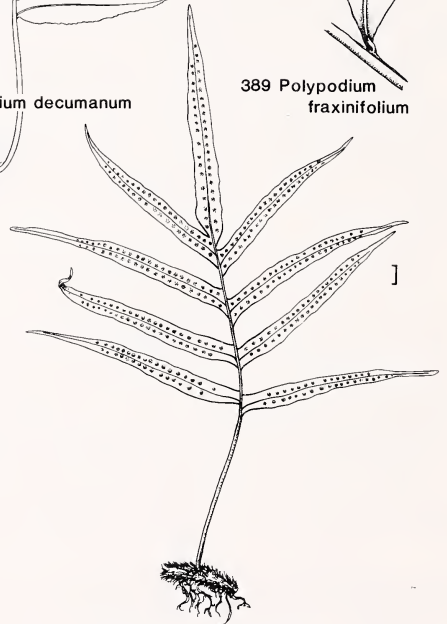
386 *Phlebodium decumanum*



389 *Polypodium fraxinifolium*



385 *Phlebodium pseudoaureum*



388 *Polypodium flagellare*

Punta (Pcia. Chiriquí). Also from Mexico, Guatemala, El Salvador, Nicaragua, Venezuela, and Colombia.

This species is related to *P. rhodopleuron* and less closely to *P. plesiosorum* Kunze, which is known from Nicaragua but not from the Flora area. From the latter species it differs in having a usually dark, abaxial stipe and rachis stripe, narrowly lanceolate-attenuate, often denticulate rhizome scales ca. 0.5–0.75 mm wide, and usually segments that are contracted distal to the base. Gómez (Brenesia 6:50–51, f. 3. 1975) has found a hybrid apparently between *P. fuscopetiolatum* and *Microgramma lycopodioides*, which he has named *M. xmoraviana*.

391. *Polypodium giganteum* Desv. Mém. Soc. Linn. Paris 6:236. 1827.

Polypodium fraxinifolium subsp. *luridum* Christ, Bull. Herb. Boissier II, 6:48. 1906. TYPE: Navarro, Pcia. Cartago, 1400 m, Wercklé (P not seen; isotype US fragm NY).

Polypodium fraxinifolium subsp. *articulatum* Christ, Bull. Herb. Boissier II, 6:49. 1906. LECTOTYPE: Turrialba, Pcia. Cartago, 550 m, Pittier 9061 (US; isoelectotype CR), chosen by Lellinger (Proc. Biol. Soc. Wash. 98:387. 1985).

Polypodium adnatum var. *glaucescens* Mille, Revista Col. Nac. Vicente Roca fuerte 9:208. 1927. TYPE: Esmeraldas, Pcia. Esmeraldas, Ecuador, Sodiro in 1904 (QCA? not seen).

TYPE LOCALITY: Brazil. No specimen was seen in the Desvaux Herbarium by Weatherby (Contr. Gray Herb. 114:30. 1936).

Plants terrestrial, at 0–1300(1700) m elevation, in forests, from north of S. Ramón, the Atlantic coastal plain of Costa Rica and adjacent slopes of the Cordillera Central, the Reventazón and Navarro valleys (Pcia. Cartago), the valley of the Río General, the vicinity of the Laguna de Chiriquí (Pcia. Bocas del Toro), near the Fortuna reservoir site (Pcia. Chiriquí), El Valle, Sta. Rita ridge (Pcia. Colón), Cerro Jefe, the El Llano–Carti road (Pcia. Panama), near Cana, and the central Chocó. Also from Venezuela, Colombia to Peru, and Brazil.

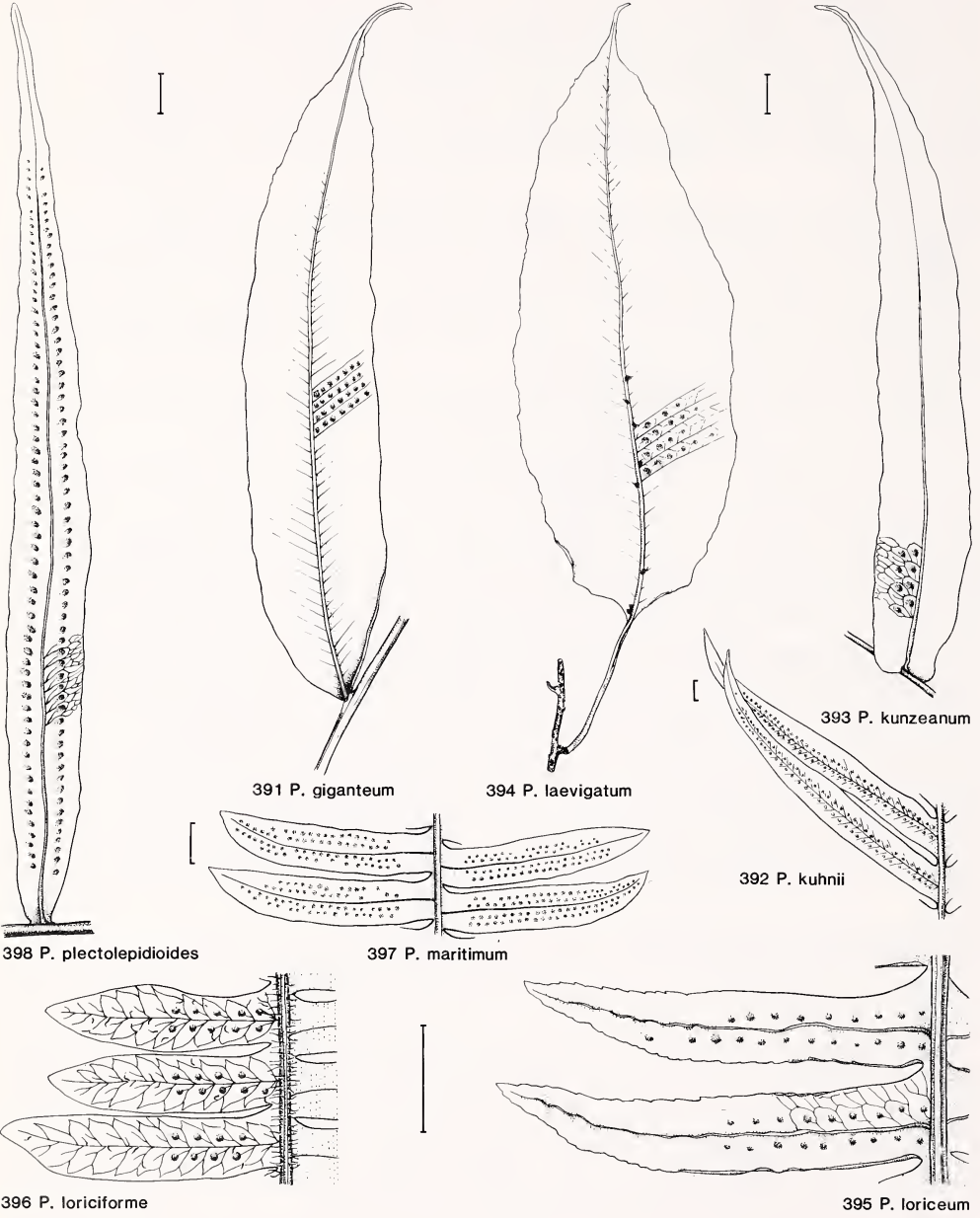
This species commonly has been identified as large *P. fraxinifolium*, but differs from that species in having adnate distal pinnae, or as *P. adnatum* Kunze ex Klotzsch, but differs from that species in lacking adnate proximal pinnae. It is also close to the Andean *P. caeceresii* Sodiro, but differs in having broader, distinctly clathrate, brownish rhizome scales and apical pinnae that are more acute at the base.

392. *Polypodium kuhnii* Fourn. Bull. Soc. Bot. France 19:251. 1872.

TYPE: Isla de Omotepe, Lago de Nicaragua, Depto. Rivas, Nicaragua, Lévy 1161 (P not seen).

Plants epiphytic, epipetric, or terrestrial, at 0–500(900) m elevation, in forests, from the vicinity of Los Chiles (Pcia. Alajuela), northeast of Turrialba (Pcia. Cartago), S. Luis de Turrubares (Pcia. S. José), the Peninsula de Osa and Golfito (Pcia. Puntarenas), near Madden Dam (Canal Zone), Uva Island (Pcia. Veraguas), Isla Taboga, Isla S. José, and the Río de la Maestra (Pcia. Panama). Also from Nicaragua, Venezuela, Colombia, and Ecuador.

FIGS. 385–390. *Phlebodium* and *Polypodium*. FIG. 385. Plant of *Phlebodium pseudoaureum*, Stern et al. 1072. FIG. 386. Plant of *Phlebodium decumanum*, Johnson 1065, Guatemala. FIG. 387. Median pinnae of *P. dissimile*, Weber 6176. FIG. 388. Plant of *P. flagellare*, Killip 2570. FIG. 389. Median pinna of *P. fraxinifolium*, Cooper 6049. FIG. 390. Plant of *P. fuscopetiolatum*, Stork 2987.



398 *P. plectolepidioides*

391 *P. giganteum*

394 *P. laevigatum*

393 *P. kunzeanum*

392 *P. kuhni*

397 *P. maritimum*

396 *P. loriciforme*

395 *P. loriceum*

393. *Polypodium kunzeanum* C. Chr. Ind. Fil. 536. 1906.

Polypodium cordatum Kunze, Linnaea 9:44. 1834, nom. illeg., non Desv., 1827. TYPE: Casapí, Depto. Huánuco, Peru, *Poeppig Diar.* 1148 in July 1829 (LZ destroyed).

TYPE: A renaming of *P. cordatum* Kunze, and so based on the type of that name.

Plants terrestrial, at 0–1000 m elevation, in forests, from Calera de S. Ramón, S. Luis de Turrubares (Pcia. S. José), the vicinity of El Valle, the Laguna la Yeguada (Pcia. Veraguas), El Valle, and Majé (Pcia. Panama). Also from Colombia, Peru, and Brazil.

394. *Polypodium laevigatum* Cav. Descr. Pl. 244. 1801.

Polypodium glaucophyllum Kunze ex Klotzsch, Linnaea 20:393. 1847. SYNTYPES: Venezuela?, *Otto* 570 (B not seen); and Mérida, Edo. Mérida, Venezuela, *Moritz* 305 (B not seen; isosyntype BR not seen photo 4999).

TYPE: Montaña de S. Antonio, Quito, Pcia. Pichincha, Ecuador, *Née* (MA not seen Killip photo 484).

Plants epiphytic, at 800–1900 m elevation, in forests, from La Palma, Cartago to the Orosi valley (Pcia. Cartago), the vicinity of El Valle, and Cana and Cerro Tacarcuna. Also from the Lesser Antilles, Venezuela, and Colombia to Peru.

A possible hybrid of this species with *P. wiesbaueri* is known from west of Molinopampa, Depto. Amazonas, Peru (*Wurdack* 1363, US). Christensen (*Dansk Bot. Ark.* 9(3):11. 1937) seems to be in error in equating *P. laevigatum* with *P. semipinnatifidum* (Fée) Mett., even if the latter species is a hybrid having *P. laevigatum* as one parent.

395. *Polypodium loriceum* L. Sp. Pl. 2:1086. 1753.

Polypodium dulce Poir. *Encyc. Méth.* 5:523. 1804. TYPE: Martinique, *collector unknown* (P-Hb. Juss. 1085 not seen microfiche S. I. Library).

Polypodium elegans Cav. ex Swartz, *Syn. Fil.* 35. 1806, non Poir., 1804, nom. illeg. TYPE: A plate in Cavanilles' "Elenchus Plantarum Horti Regii Matritensis." Reference not seen.

Polypodium ramosum Lodd. ex Link, *Hort. Reg. Bot. Berol.* 2:97. 1833. TYPE: Cultivated in the garden at London, origin unknown, *Loddiges* (K? not seen).

Polypodium falcaria Kunze, Linnaea 18:316. 1845. TYPE: Mexico, *Leibold* 90b (LZ destroyed; isotypes Hb. Roemer, B, P none seen).

Goniophlebium calaguala Fée, *Mém. Soc. Sci. Hist. Nat. Strasbourg* 5 [Mém. Foug. 8]:93. 1857. TYPE: Valley of Mexico, Mexico, *Schaffner* (P or RB not seen).

Goniophlebium invertens Fée, *Mém. Soc. Sci. Hist. Nat. Strasbourg* 5 [Mém. Foug. 7]:33, t. 37, f. 3. 1865. TYPE: Mt. Orizaba, Edo. Veracruz, Mexico, *Schaffner* 424 (RB not seen).

?*Polypodium chartaceum* Baker, *J. Bot. Brit. For.* 15:166. 1877. TYPE: Near Nieblí, Pcia. Pichincha, Ecuador, Dec 1871, *Sodiño* 48/43 (K not seen fragm US).

Polypodium loriceum var. *heterolepis* Sodiño, *Anales Univ. Quito* 11(72): 28 (repr. 352). 1894. TYPE: Not stated.

Polypodium loriceum var. *oligomerum* Christ in Dur. & Pitt. *Bull. Soc. Bot. Belgique* 35, *Mém.* 221. 1896. TYPE: La Verbena, Pcia. S. José, *Tonduz* 8804 (BR not seen).

FIGS. 391–398. *Polypodium*. FIG. 391. Distal pinna of *P. giganteum*, Seemann. FIG. 392. Median pinna of *P. kuhnii*, Erlanson 473. FIG. 393. Median pinna of *P. kunzeanum*, Allen 748. FIG. 394. Plant of *P. laevigatum*, Lankester 619. FIG. 395. Median segments of *P. loriceum*, Standley & Valerio 46989. FIG. 396. Median segments of *P. loriceum*, Mickel 3533. FIG. 397. Median segments of *P. maritimum*, Correa A. 343. FIG. 398. Pinna of *P. plectolepidioides*, Brade 168.

Polypodium loriceum var. *obscurum* Rosenst. Repert. Spec. Nov. Regni Veg. 6:308. 1909, as "*obscura*." TYPE: Mt. Abitagua, Andes of Quito, Pcia. Pichincha, Ecuador, *Spruce* 5234 (S not seen).

Polypodium loriceum var. *squamuligera* Rosenst. Repert. Spec. Nov. Regni Veg. 6:308. 1909. TYPE: Mt. Tungurahua, Pcia. Tungurahua, Ecuador, *Spruce* 5233 (S not seen).

Polypodium beyerianum Rosenst. Repert. Spec. Nov. Regni Veg. 22:17. 1925. LECTOTYPE: Turrialba, Pcia. Cartago, 650 m, *Brade & Brade* 21 (S photo 5953; isolectotypes NY, UC), chosen by Lellinger (Proc. Biol. Soc. Wash. 98:387. 1985).

Polypodium loriceum f. *duplisorum* Domin, Rozpr. Král. České Společn. Nauk, Tř. Mat.-Přír. 2 [Pterid. Dominica]:130. 1929, as "*duplisora*." LECTOTYPE: Heights of Aripo, Trinidad, *Broadway* 9957a (NY; isolectotype US), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:727. 1977).

LECTOTYPE: Plate 7, f. 10 of Petiver's "Pterigraphia Americana," which is a left-to-right transposition of t. 78 of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique, chosen by Proctor (Fl. Less. Antill. 2:331. 1977).

Plants epiphytic, at (500)1000–3000 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, Sta. Rita ridge (Pcia. Colón), Cana and vicinity, and the Ciudad Bolívar–Quibdó road at Km. 141 and the Río Tamaná (both Depto. Chocó). Also from the Antilles, Mexico to Nicaragua, Venezuela, Colombia to Bolivia, and Brazil.

396. *Polypodium loriciforme* Rosenst. Repert. Spec. Nov. Regni Veg. 22:17. 1925.

TYPE: Llanuras de S. Carlos, Pcia. Heredia, 200 m, *Brade & Brade* 493 (S not seen photo 6015; isotypes NY, UC).

Plants epiphytic, at 0–1500 m elevation, in forests, from the Atlantic coastal plain of Costa Rica, the Atlantic slope of Volcán Barba, the valley of the Río Reventazón, and the ridge above Platanillo (Pcia. Cartago), near Fortuna (Pcia. Chiriquí), northwest of Sta. Fé, El Cope (Pcia. Coclé), and Cerro Pirre.

397. *Polypodium maritimum* Hieron. Bot. Jahrb. Syst. 34:527. 1904.

SYNTYPES: Río Dagua near Buenaventura, Depto. El Valle, Colombia, *Lehmann* 5035 (B not seen; isotype US); and Río Micay, Depto. Cauca, Colombia, *Lehmann* 8922 (B not seen).

Plants epiphytic, at 0–900 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Atlantic coastal plain of Costa Rica and western Panama, near Sta. Fé, near El Valle, around Portobelo (Pcia. Colón), Cerro Campana and Sta. Rita ridge (both Pcia. Panama), and throughout the northern half of the Chocó. Also from Nicaragua, Venezuela, Colombia, and Ecuador.

398. *Polypodium plectolepidioides* Rosenst. Repert. Spec. Nov. Regni Veg. 10:278. 1912.

Polypodium loriceum var. *umbraticum* Christ, Bull. Herb. Boissier II, 5:5. 1905. TYPE: Costa Rica, *Wercklé & Brune* (P not seen; possible isotype US).

TYPE: Turrialba, Pcia. Cartago, 650 m, *Brade & Brade* 361 (*Ros. Fil. Costar. Exs.* 168) (S; isotypes GH, NY, UC, US).

Plants epiphytic, at 600–1000 m elevation, from the upper Río Reventazón valley (Pcia. Cartago).

399. *Polypodium ptilorhizon* Christ, Bull. Herb. Boissier II, 5:6. 1905.

TYPE: Costa Rica, *Wercklé* in 1904 (P not seen).

Plants epiphytic, at 1000–2500 m elevation, in forests and open areas, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, Cerro Pilon (Pcia. Coclé), and Cerro Pirre. Also from Nicaragua.

400. *Polypodium rhodopleuron* Kunze, Linnaea 18:315. 1845.

SYNTYPES: Xalapa, Edo. Veracruz, Mexico, *Schiede & Deppe* 745 (LZ destroyed; probable isosyntype P not seen); and Mexico, *Leibold* 91 p. p. (LZ destroyed).

Plants epiphytic, at 400–1900 m elevation, in forests, from the Cordillera de Tilarán, Cerro Carpintera, the Reventazón and Orosi valleys (Pcia. Cartago), and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico, Guatemala, El Salvador, and Nicaragua.

This species is sometimes confused with *P. plesiosorum* Kunze, which occurs from Mexico to Nicaragua. It differs in having narrower laminae 2–4 times longer than wide and 6.5–10(13) cm wide, versus laminae 1.5–2.5 times longer than wide and 8–18 cm wide in *P. plesiosorum*, which also lacks reddish rachises and has very broadly ovate, subappressed rhizome scales and hairs on the adaxial surface of the rachis and costae.

401. *Polypodium sessilifolium* Desv. Mém. Soc. Linn. Paris 6:238. 1827.

Polypodium surucuchense Hook. Icon. Pl. 1:t. 69. 1837. TYPE: Surucucho, near Cuenca, Pcia. Azuay, Ecuador, *Jameson* (K not seen).

Polypodium andinum Karst. Fl. Columb. 1:171, t. 85. 1861, nom. illeg., non Hook., 1860. TYPE: Near Bogotá, Depto. Cundinamarca, Colombia, *Karsten* (LE or W not seen).

Polypodium remotum Baker, Ann. Bot. (London) 5:470. 1891, nom. illeg., non Desv., 1827. TYPE: Salazar, Depto. Norte de Santander, Colombia, *Kalbreyer* 843 (K not seen Maxon photo 308).

Polypodium uniseriale C. Chr. Ind. Fil. 572. 1906. TYPE: A renaming of *P. remotum* Baker, and so based on the type of that name.

Polypodium sessilifolium var. *papallactensis* Mille, Revista Col. Nac. Vicente Rocafuerte 9:211. 1927. TYPE: Ecuador, *Mille* 2002 (QCA? not seen; isotype P not seen).

Polypodium pseudofraternum A. C. Smith, Bull. Torrey Bot. Club 58:307. 1931. TYPE: Cerro Duida, Edo. Amazonas, Venezuela, *Tate* 645 (NY not seen fragm US).

TYPE: Peru, *collector unknown* (P not seen Cintract photo).

Plants epiphytic, at 2000–2700 m elevation, in forests, from the Cordillera Central and Madre de Selva (Pcia. Cartago). Also from Colombia to Bolivia.

Specimens from Mexico named *P. sessilifolium* Liebm. (Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:192 (repr. 401). 1849) are another species; Liebmann's name is a later homonym. *Polypodium antillense* Maxon (Proc. Biol. Soc. Wash. 43:83. 1930) is an allied species.

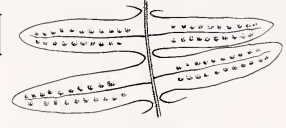
402. *Polypodium subviride* Lellinger, Proc. Biol. Soc. Wash. 98:389, f. 17. 1985.

TYPE: La Eneida region near Cerro Jefe, Pcia. Panama, *Kennedy* 1117 (US).

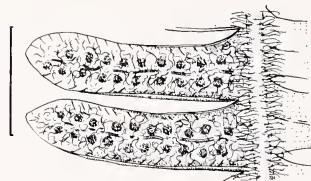
Plants epiphytic, at 600–1200 m elevation, in forests, from near Sta. Fé, El Valle and Bismark (Pcia. Coclé), near Colón (Pcia. Colón), Cerro Jefe, and Cerro Pirre. Also from Colombia and Ecuador.



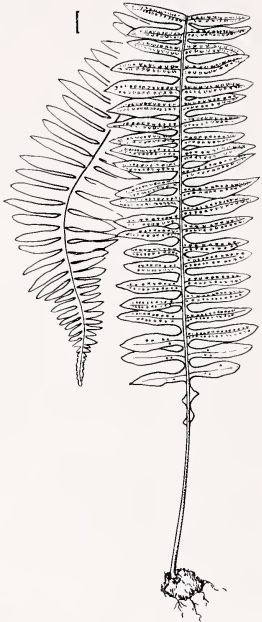
400 *P. rhodopleuron*



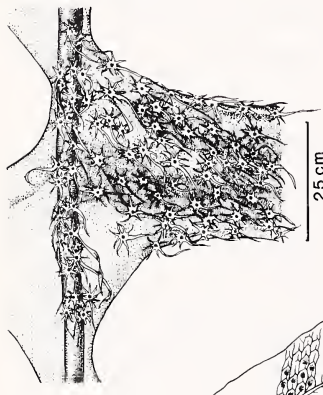
399 *P. ptilorhizon*



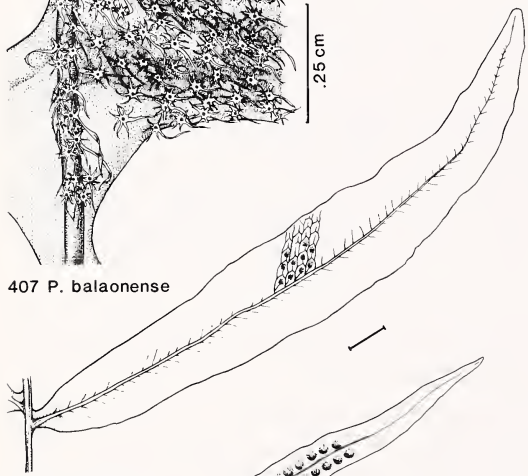
402 *P. subviride*



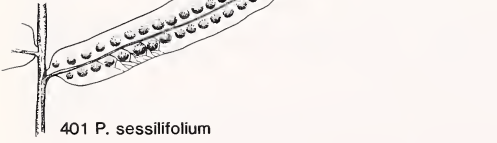
404 *P. wagneri*



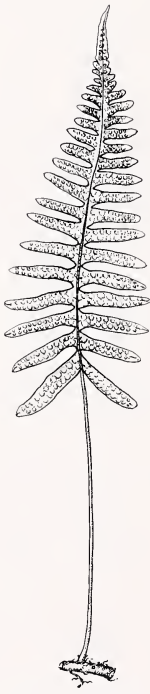
407 *P. balaonense*



403 *P. triseriale*



401 *P. sessilifolium*



405 *P. wiesbaueri*



406 *P. Xaspidiolepis*

403. *Polypodium triseriale* Swartz, J. Bot. (Schrader) 1800(2):26. 1801.

Polypodium brasiliense Poir. Encyc. Méth. 5:525. 1804. LECTOTYPE: Plate 40 from vol. 1 of Sloane's "Voyage...", chosen by Proctor (Ferns Jamaica 531. 1985).

Polypodium nerifolium Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 1:14, t. 15. 1804. TYPE: Locality and collector unknown (Hb. Breyne not seen).

Polypodium attenuatum Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:191. 1810. TYPE: Caracas, Distr. Fed., Venezuela, *Humboldt & Bonpland* (B-Hb. Willd. 19683-1 to -3 not seen Tryon photos).

Polypodium variolatum Willd. Sp. Pl. ed. 4, 5:192. 1810. TYPE: Brazil, *Sieber?*, *comm. Hoffmannsegg* (B-Hb. Willd. 19685-1 to -3 not seen Tryon photos), synonymized by Morton (Contr. U. S. Natl. Herb. 38:66. 1967).

Polypodium albopunctatum Raddi, Opusc. Sci. 3:287. 1819. TYPE: Brazil, *Raddi* (FI not seen).

Polypodium longifolium K. Presl, Delic. Prag. 1:167. 1822, nom. illeg., non Cav., 1802. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *collector unknown* (PRC not seen).

Polypodium elatius Schrad. Goett. Gel. Anz. 1824:868. 1824. TYPE: Brazil, *Prince Maximilian von Wied-Neuwied* (LE? not seen).

Polypodium lucens Schrad. Goett. Gel. Anz. 1824:868. 1824. TYPE: Brazil, *Prince Maximilian von Wied-Neuwied* (LE? not seen).

Polypodium prestianum Spreng. Syst. Veg. ed. 4. index. 1828; Link, Hort. Reg. Bot. Berol. 2:102. 1833. TYPE: Presumably a renaming of *P. longifolium* K. Presl, and so based on the type of that name.

Polypodium gladiatum Kunze, Linnaea 9:45. 1834, nom. illeg., non Vell., 1827. TYPE: Cuba, *Poeppig* (LZ destroyed; probable isotype BR not seen photo 4981).

Polypodium campylopodum Klotzsch, Linnaea 20:395. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz* 352 (B not seen).

?*Polypodium xiphophoron* Kunze ex Mett. Abh. Senckenberg. Naturf. Ges. 2:73. 1856. SYNTYPES: Surinam, *Kegel* (B not seen); Brazil, *Pohl* (B not seen); and French Guiana, *Leprieur* (B not seen).

Goniophlebium intermedium Fée, Hist. Foug. Antill. [Mém. Foug. 11]:69, t. 18, f. 3. 1866. TYPE: Guadeloupe, *L'Herminier* (RB not seen).

?*Goniophlebium gauthieri* Fée, Crypt. Vasc. Brésil 1:112, t. 34, f. 3. 1869. SYNTYPES: Brazil, *Glaziou* 2406 (P or RB not seen); and Ilha Sta. Catarina, Est. Sta. Catarina, Brazil, *Gauthier* (RB not seen).

Polypodium palma Vellozo, Fl. Flumin. 11:t. 69. 1831; Arq. Mus. Nac. Rio de Janeiro 5:447. 1881. TYPE: Plate 69, illustrating material collected around Rio de Janeiro by Vellozo; apparently no specimens were made or are now extant.

Polypodium nerifolium var. *acuminatissimum* Kuntze, Revis. Gen. Pl. 2:819. 1891. TYPE: Between Turrialba and Cartago, Pcia. Cartago, *Kuntze* [*Hb.?*] 2256 (not seen; isotype NY).

Polypodium nerifolium var. *heterophyllum* Kuntze, Revis. Gen. Pl. 2:819. 1891. TYPE LOCALITY: Trinidad.

Goniophlebium ampliatus Maxon, Contr. U. S. Natl. Herb. 10:492. 1908. TYPE: A renaming of *Polypodium gladiatum* Kunze, and so based on the type of that name.

Polypodium prestianum var. *immersum* Rosenst. Repert. Spec. Nov. Regni Veg. 6:314. 1909, as "*immersa*." TYPE: S. Antonio near Mapiri, Depto. La Paz, Bolivia, 800 m, *Buchtien* 1062 (S not seen; isotype US).

FIGS. 399–407. *Polypodium*. FIG. 399. Median segments of *P. pitlorhizon*, Burger & Stolze 5331. FIG. 400. Plant of *P. rhodopleuron*, Standley & Valerio 44662. FIG. 401. Median pinna of *P. sessilifolium*, Alfaro 122. FIG. 402. Median segments of *P. subviride*, Correa & Dressler 160. FIG. 403. Median pinna of *P. triseriale*, Stork 2473. FIG. 404. Plant of *P. wagneri*, Allen 1960. FIG. 405. Plant of *P. wiesbaueri*, Weber 6229. FIG. 406. Frond of *P. aspidiolepis*, Scamman 6124. FIG. 407. Adaxial surface of pinna base of *P. balaonense*, Haught 2868.

Polypodium brasiliense var. *pleiosorum* Rosenst. ex Hassl. Trab. Inst. Bot. Farm. Buenos Aires 45:71. 1928. SYNTYPES: Paraguay, *Hassler 10139, 10139a, 11615* (all G none seen; possible isosyntypes NY not seen); and Paraguay, *Rojas 3960* (G not seen; possible isosyntype NY not seen).

TYPE: "India orientalis," *collector unknown* (UPS-Hb. Thunberg not seen).

Plants epiphytic, at 0–1500 m elevation, in forests, from throughout the Flora area except the drier portions of northwestern Costa Rica and western Panama. Also from the Antilles, Mexico to Nicaragua, and tropical South America.

A possible hybrid with *P. fraxinifolium* is known from near Boquete (*Killip 5171, Cornman 928*, both US).

404. *Polypodium wagneri* Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:255 (repr. 337). 1864.

Goniophlebium pectinatum J. Smith, Bot. Voy. Herald 230. 1854, nom. illeg., non J. Smith, 1841. TYPE: New city of Panama, Pcia. Panama, *Seemann 14* (BM not seen; isotype K not seen Maxon photo 245 fragm US).

Polypodium costaricense Christ in Bommer & Christ, Bull. Herb. Boissier 4:660. 1896. TYPE: Plain of Surubres south of Puntarenas, Pcia. Puntarenas, *Biolley 2677* (BR not seen photo 4985; isotypes BR not seen photo 4986, US fragm NY).

SYNTYPES: Ocaña, Depto. Norte de Santander, Colombia, *Schlim 636* (B not seen); Panama, *Wagner* (B not seen); and Panama, *Hayes* (B not seen).

Plants epiphytic, at 0–1000(1800) m elevation, in forests, from Naranjo de Alajuela (Pcia. Alajuela), the lower end of the Meseta Central, the valley of the Río General, the Pacific side of the mountains of Panama from Boquete to El Valle, Guaniquito (Pcia. Los Santos), the Canal Zone and adjacent Pcia. Panama, near Cana and near El Real (Pcia. Darién), and the Serranía del Darién east of Unguía (Depto. Chocó). Also from Venezuela and Ecuador.

405. *Polypodium wiesbaueri* Sodiro, Recens. Crypt. Vasc. Quit. 65. 1883.

TYPE: Eastern slopes of Mt. Pichincha, Pcia. Pichincha, Ecuador, above 3000 m, *Sodiro* (Hb. Sodiro not seen).

Plants epiphytic or occasionally epipetric, at 2000–3000 m elevation, in forests, pastures, and on roadsides, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Colombia and Ecuador.

This species can be divided into small, compact forms and large, lax ones. The differences presumably are due to an exposed versus a protected habitat, and are not of taxonomic significance.

POLYPODIUM subg. MARGINARIA (Bory) C. Chr.

406. *Polypodium xaspidiolepis* Baker, J. Bot. Brit. For. 25:26. 1887.

Polypodium thyssanolepis var. *bipinnatifidum* Christ in Bommer & Christ, Bull. Herb. Boissier 4:661. 1896. TYPE: S. Rafael de Cartago, Pcia. Cartago, 1600 m, *Pittier 9721* (BR not seen; isotype US).

TYPE: Costa Rica, *Cooper* (K not seen).

Plants epiphytic or sometimes epipetric, at 1400–2400 m elevation, in pastures and along roads, from the southern slope of Volcán Irazú.

This species is a hybrid between *P. friedrichsthalianum* and *P. thyssanolepis*, according to Wagner, Wagner, and Gómez (Brenesia 12/13:81–101. 1977).

Apparent backcrosses between this hybrid and *P. thyssanolepis* are known from Sanitorio Durán and vicinity (*Scamman 7223, Weber 6042*, both GH).

407. *Polypodium balaonense* Hieron. Bot. Jahrb. Syst. 34:529. 1904.

TYPE: Near Balao, Pcia. Guayas, Ecuador, *Eggers 14286* (B not seen; isotypes F not seen, US).

Plants epiphytic, in forests, in the Flora area known only from Tres Bocas on the Río Coasi, Pcia. Darién (*Kirkbride & Duke 1385*, NY) and from the “Isthmus of Darien” (*Seemann*, US). Also from Colombia to Peru.

408. *Polypodium bombycinum* Maxon, Contr. U. S. Natl. Herb. 17:592. 1916.

TYPE: Río Dagua, Depto. El Valle, Colombia, 300–1000 m, *Lehmann 7666* (US; isotype GH not seen).

Plants epiphytic, at 100–1100 m elevation, in the Flora area known only from S. Francisco, Pcia. Veraguas (*Powell*, US), near El Copé, Pcia. Coclé (*Davidse & Hamilton 23682*, UC), and near Cana (*Goldman 1915*, US). Also from Venezuela, Colombia, Bolivia, Guyana, and Brazil.

409. *Polypodium collinsii* Maxon, Contr. U. S. Natl. Herb. 17:583, t. 41. 1916.

Polypodium mickelii de la Sota, Revista Mus. La Plata, Secc. Bot. 10:163. 1966. TYPE: Along ridge 3–5 km south of Villa Alta, Edo. Oaxaca, Mexico, *Mickel 1130* (ISC; isotypes LP, NY).

TYPE: Near Pantepec, Edo. Chiapas, Mexico, *Collins & Doyle 227* (US).

Plants epiphytic, in the Flora area known only from specimens grown at the University of California Botanical Garden, Berkeley, received from C. H. Lankester, Las Cónavas, Pcia. Cartago, Costa Rica. Also from Mexico.

This species is included on the somewhat dubious presumption that Lankester’s material, the only known from Costa Rica, originated in the wild and was not sent to Lankester from Mexico and grown by him.

410. *Polypodium fallax* Schlechtend. & Cham. Linnaea 5:609. 1830.

Polypodium margaritifera Christ, Bull. Herb. Boissier II, 5:2. 1905. TYPE: Sto. Domingo de Golfo Dulce, Pcia. Puntarenas, 0 m, *Tonduz 11257* (P not seen; isotype US).

Polypodium tuerckheimii Christ, Bull. Herb. Boissier II, 5:254. 1905. TYPE: Qubilquitz, Depto. Alta Verapaz, Guatemala, 350 m, *von Tuerckheim 7721* (P not seen Weatherby photo US).

TYPE: Misantla region, Edo. Veracruz, Mexico, *Schiede & Deppe* (B? not seen).

Plants epiphytic, at 0–800 m elevation, in forests, from the Río General valley and Sto. Domingo de Golfo Dulce (Pcia. Puntarenas). Also from Mexico to Honduras, and Nicaragua.

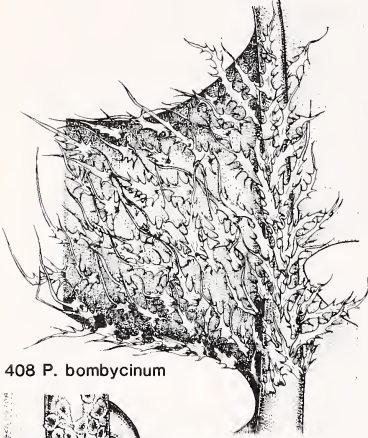
411. *Polypodium friedrichsthalianum* Kunze, Farrnkräuter 2:55, t. 123. 1850.

TYPE: Guatemala, *Friedrichsthal Pl. Guat. Exs. 1322* (LZ destroyed; isotype W not seen).

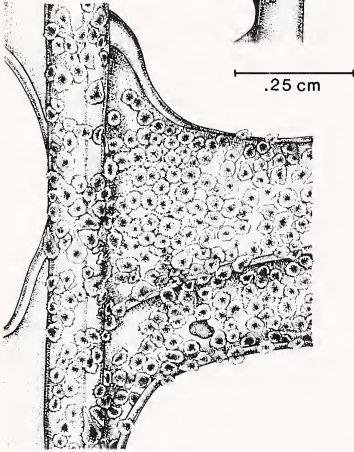
Plants epiphytic or rarely epipetric, at 800–1900 m elevation, in pastures and along roadsides, from the Cordillera Central, the Mesta Central, Cerro Carpintera, and the northeastern slopes of the Cordillera de Talamanca. Also from Guatemala.

412. *Polypodium furfuraceum* Schlechtend. & Cham. Linnaea 5:607. 1830.

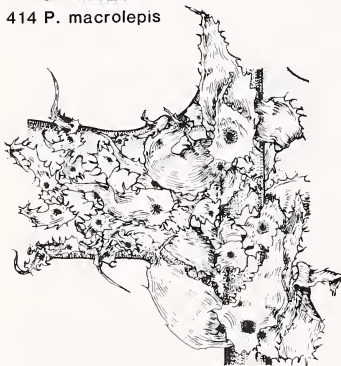
Polypodium nivolum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:89. 1857. TYPE: Huatusco, Edo. Veracruz, Mexico, *Schaffner 193* (RB not seen).



408 *P. bombycinum*



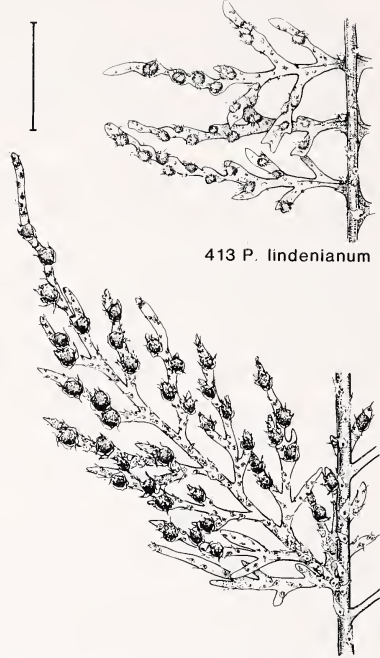
414 *P. macrolepis*



412 *P. furfuraceum*

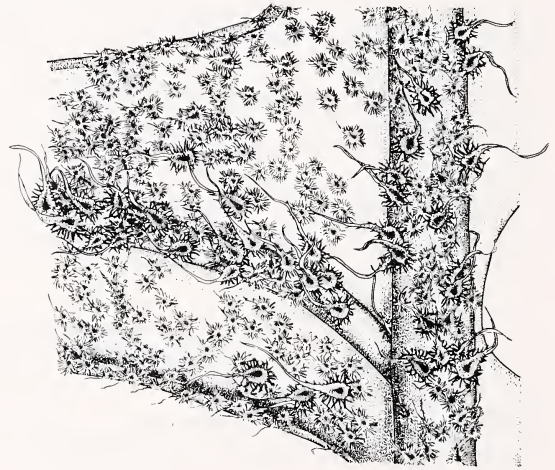


410 *P. fallax*



413 *P. lindenianum*

411 *P. friedrichsthalianum*



409 *P. collinsii*

Polypodium macbridense Shimek, Ferns Nicaragua 199, t. 20, f. 6–9. 1897. TYPE: Opposite El Castillo, Depto. Río S. Juan, Nicaragua, *Shimek* (ISC not seen).

Polypodium margallii Rovirosa, Pteridogr. Sur México 206, t. 38A, f. 1–5. 1910. TYPE: Mesa de Coapilla, Edo. Chiapas, Mexico, 1700 m, *Rovirosa 1061* (K not seen; isotype PH not seen Morton photo).

TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede & Deppe* [750] (B not seen; isotypes LE not seen, MO, P not seen).

Plants epiphytic or rarely epipetric or terrestrial, at 0–2400 m elevation, in forests, pastures, and along roadsides, from the Cordillera de Tilarán, the Cordillera Central, the Meseta Central, the Atlantic coastal plain of Costa Rica, the Cordillera de Talamanca to Pcia. Chiriquí, and Cana and vicinity. Also from Mexico to Nicaragua.

413. *Polypodium lindenianum* Kunze, Farrnkräuter 2:83, t. 134. 1851.

Polypodium cancellatum Fée, Gen. Fil. [Mém. Foug. 5]:242. 1852. TYPE: Cuba [Edo. Chiapas, Mexico, according to A. R. Smith (Fl. Chiapas 2:188. 1981)], *Linden* (RB not seen; isotype P not seen).

SYNTYPES: Near S. Bartolo, Edo. Chiapas, Mexico, March, *Linden* (LZ destroyed); Yerba Buena, Edo. Chiapas, Mexico, *Linden* (LZ destroyed); Edo. Chiapas, Mexico, 7000 ft, March 1840, *Linden* (LZ destroyed); and Edo. Chiapas, Mexico, *Linden s. n.* and 1539 (LZ destroyed; isosyntypes P not seen). The numbered collection surely is *Linden 1539*, according to Kunze (Farrnkräuter 2:56. 1851).

Plants epiphytic, at 600–1500 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, and the Cachí reservoir (Pcia. Cartago). Also from Mexico to Honduras, and Nicaragua.

414. *Polypodium macrolepis* Maxon, Contr. U. S. Natl. Herb. 17:584. 1916.

TYPE: Near Camp Aguacatal, east slope of Volcán Chiriquí, Pcia. Chiriquí, 2100–2300 m, *Maxon 5278* (US).

Plants epiphytic, at 2000–3200 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí.

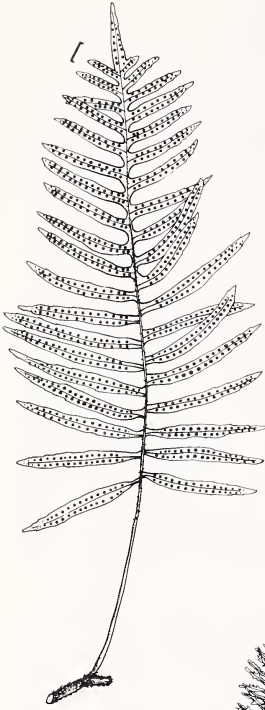
This species differs from the similar *P. myriolepis* in having spreading, rather than appressed, rhizome scales.

415. *Polypodium montigenum* Maxon, Publ. Field Mus. Nat. Hist., Bot. Ser. 17:306. 1938.

?*Polypodium plebeium* var. *cooperi* Baker, J. Bot. Brit. For. 25:25. 1887. TYPE: Costa Rica, *Cooper* (K not seen; isotype US).

TYPE: Between Vara Blanca and La Concordia, Pcia. Heredia, 1600–1950 m, *Maxon & Harvey 8479* (US; isotypes GH, NY).

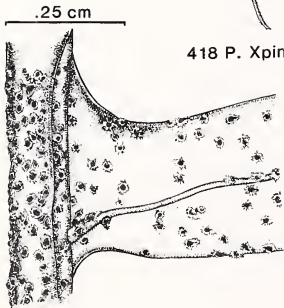
FIGS. 408–414. *Polypodium*. FIG. 408. Adaxial surface of pinna base of *P. bombycinum*, Uribe U. 1910, Colombia. FIG. 409. Adaxial surface of pinna base of *P. collinsii*, Lankester (cultivated, originally from Costa Rica). FIG. 410. Plant of *P. fallax*, Skutch 3060. FIG. 411. Median pinna of *P. friedrichsthalianum*, Stork 4794. FIG. 412. Abaxial surface of pinna base of *P. furfuraceum*, A. Smith. FIG. 413. Median pinnae of *P. lindenianum*, Standley & Valerio 44449. FIG. 414. Abaxial surface of pinna base of *P. macrolepis*, Mickel 3326.



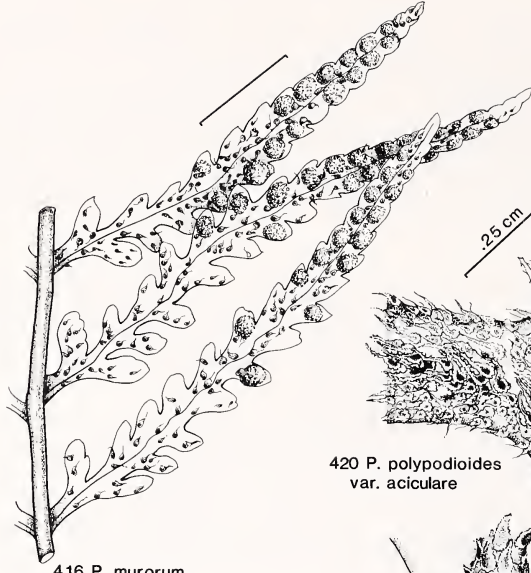
415 *P. montigenum*



418 *P. xpinatisectum*



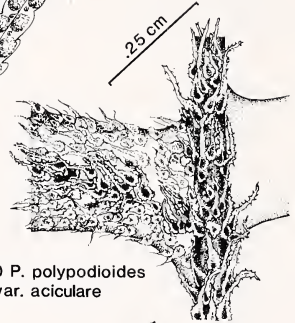
417 *P. myriolepis*



416 *P. murorum*



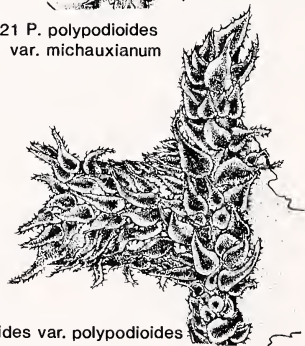
419 *P. plebeium*



420 *P. polypodioides*
var. *aciculare*



421 *P. polypodioides*
var. *michauxianum*



422 *P. polypodioides* var. *polypodioides*

Plants epiphytic or rarely epipetric or terrestrial, at 1500–2800 m elevation, in forests, open places, and roadsides, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico to Nicaragua.

Positive determination of *P. plebeium* var. *cooperi* requires rhizome material; the isotype is only a single, detached frond.

416. *Polypodium murorum* Hook. Icon. Pl. 1:t. 70. 1837.

TYPE: Vicinity of Quito, Pcia. Pichincha, Ecuador, *Jameson* 49 (K not seen).

Plants epipetric or epiphytic, at 2700–3400 m elevation, in forests, pastures, and roadsides, from Volcán Irazú and the Cordillera de Talamanca from the Cerro de la Muerte (Pcia. Cartago) to Cerro Chirripó (Pcias. Cartago and S. José). Also from Hispaniola, Venezuela, and Colombia.

417. *Polypodium myriolepis* Christ in Bommer & Christ, Bull. Herb. Boissier 4:661. 1896.

Polypodium costaricanum Hieron. Bot. Jahrb. Syst. 34:530. 1904, non *P. costaricense* Christ, 1896. LECTOTYPE: Volcán Irazú, Pcia. Cartago, *Wendland* 644 (B not seen), chosen by de la Sota (Revista Museo La Plata, Secc. Bot. 10:169. 1966).

Polypodium wendlandii Hieron. Hedwigia 44:180. 1905, nom. superfl. TYPE: A renaming of *P. costaricanum* Hieron., and so based on the type of that name.

TYPE: La Palma, Pcia. S. José, 1500–1700 m, *Tonduz* 9692 (BR not seen photo 5030; isotype US).

Plants epiphytic, at 1000–3000 m elevation, in forests, from the Cordillera Central, Cerro Tablazo, and the Cordillera de Talamanca to Pcia. Chiriquí.

418. *Polypodium* ×*pinnatisectum* (Brade) Gómez, Amer. Fern J. 66:28. 1976.

Polypodium furfuraceum f. *pinnatisectum* Brade, Bradea 1:16, t. 5. 1969, as “*pinnatisecta*.” TYPE: Cerro Carpintera, Pcia. Cartago, 1800 m, *Brade & Brade* 16 (HB not seen).

Plants epiphytic, at 1200–1800 m elevation, in forests, from Monte de la Cruz (Pcia. Heredia), Cerro Carpintera, and the Cachí reservoir (Pcia. Cartago).

According to Gómez (Amer. Fern J. 66:28. 1976), this species is a hybrid between *P. friedrichsthalianum* and *P. furfuraceum*.

419. *Polypodium plebeium* Schlechtend. & Cham. Linnaea 5:607. 1830.

Polypodium karwinskyanum A. Braun ex Kunze, Linnaea 23:279, 319. 1850. TYPE: Guatemala, *Friedrichsthal* 76 (LZ destroyed?).

Polypodium cheilostictum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:87. 1857. TYPE: Orizaba, Edo. Veracruz, Mexico, *Schaffner* 453 (RB not seen).

Polypodium cartilagineum K. Presl ex Ettingsh. Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., 22:79. 1864; Farnkr. Jetztw. 38, t. 15, f. 8. 1864. TYPE: Not stated.

TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede & Deppe* [746] (B not seen; isotype LE not seen).

FIGS. 415–422. *Polypodium*. FIG. 415. Plant of *P. montigenum*, de la Sota 5074. FIG. 416. Median pinnae of *P. murorum*, Mickel 3253. FIG. 417. Adaxial surface of pinna base of *P. myriolepis*, Standley & Valerio 50229. FIG. 418. Frond of *P. pinnatisectum* (after Brade). FIG. 419. Plant of *P. plebeium*, Stork 4761. FIG. 420. Abaxial surface of pinna base of *P. polypodioides* var. *aciculare*, Standley 33312. FIG. 421. Abaxial surface of pinna base of *P. polypodioides* var. *michauxianum*, Carpenter 329. FIG. 422. Abaxial surface of pinna base of *P. polypodioides* var. *polypodioides*, Johnston 123.

Plants epiphytic, at 1300–2500 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, Cerro Piedra Blanca (Pcia. S. José), the Cordillera de Talamanca to Pcia. Chiriquí, and near Sta. Fé. Also from Mexico, Guatemala, and Honduras to Nicaragua.

420. *Polypodium polypodioides* var. *aciculare* Weath. Contr. Gray Herb. 124:33. 1939.

TYPE: Río Torres near S. Francisco de Guadalupe, Pcia. S. José, 1170 m, *Tonduz 8476* (GH fragm US).

Plants epiphytic or rarely epipetric, at 1000–2500 m elevation, in forests, open areas, and roadsides, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico, Guatemala, El Salvador, and Nicaragua.

This variety is largely altitudinally distinct from the others of this species. The acicular scales that characterize it are found on the abaxial surface of the laminae. Non-diagnostic, similar scales are found on the frond margins of all of the *P. polypodioides* varieties found in the Flora area.

421. *Polypodium polypodioides* var. *michauxianum* Weath. Contr. Gray Herb. 124:31. 1939.

TYPE: Kilby, Nansemond County, Virginia, U.S.A., *Fernald et al. 4703* (GH not seen).

Plants epiphytic, at 0–1100(1700) m elevation, in forests, from the Cabo Blanco Nature Reserve and Nicoya (Pcia. Puntarenas), the Cordillera de Tilarán, the Meseta Central, the Atlantic lowlands of Costa Rica and Panama, near the Fortuna reservoir site (Pcia. Chiriquí), and Isla Taboga (Pcia. Panama). Also from the United States, Mexico, Guatemala, Honduras, and Nicaragua.

422. *Polypodium polypodioides* (L.) D. Watt, *Canad. Naturalist & Quart. J. Sci. N.S.*, 3:158. 1867, var. *polypodioides*.

Acrostichum polypodioides L. Sp. Pl. 2:1068. 1753. LECTOTYPE: Jamaica, *collector unknown* (BM-Hb. Plukenet not seen), chosen by Weatherby (Contr. Gray Herb. 124:28. 1939).

Acrostichum ferruginosum L. Sp. Pl. ed. 2, 2:1525. 1763. TYPE: Plate 89, f. 9 of Plukenet's "Phytographia," as cited by Browne (Civ. Nat. Hist. Jamaica, ed. 2:105. 1789). No specimen that could be a type is present in the Linnaean Herbarium.

Acrostichum ferrugineum L. Syst. Nat. ed. 12, 2:686. 1767, nom. superfl. TYPE: An inadvertent renaming of *A. ferruginosum* L., and so based on the type of that name.

Polypodium incanum Swartz, Nov. Gen. Sp. Pl. Prodr. 131. 1788, nom. superfl. TYPE: A renaming of *A. polypodioides* L., and so based on the type of that name.

Polypodium ceteraccinum Michx. Fl. Bor.-Amer. 2:271. 1803, nom. superfl. TYPE: A renaming of *A. polypodioides* L., and so based on the type of that name.

Polypodium velatum Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 2:188, t. 11b. 1805, nom. superfl. TYPE: A renaming of *A. polypodioides* L., and so based on the type of that name.

Polypodium chrysoconion Spreng. Syst. Veg. ed. 16, 4:51. 1827. TYPE: Plate 77 of Plumier's "Traité...," which illustrates a specimen collected by Plumier on Hispaniola.

?*Polypodium incanum* var. *umbrosum* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:212 (repr. 60). 1849. TYPE: Chinantla District, Edo. Oaxaca, Mexico, 4000–5000 ft, *Liebmann* (C? not seen).

?*Polypodium incanoides* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:88. 1857. TYPE: Huatusco, Edo. Veracruz, Mexico, *Schaffner 199* (RB not seen).

?*Polypodium incanum* var. *oblongum* Fourn. Mexic. Pl. 1:83. 1872, as “*oblonga*.” TYPE: A renaming of *P. incanoides* Fée, and so based on the type of that name.

?*Polypodium mesetae* Christ, Bull. Herb. Boissier II, 6:49. 1906. TYPE: Meseta Central, Pcia. S. José, 2000 m, *Alfaro 16907* (P not seen).

Plants epiphytic, at 0–700 m elevation, in forests and open areas, from the Peninsula de Nicoya (Pcia. Guanacaste), the Meseta Central, the Atlantic coastal plain of Costa Rica, near Sta. Fé, El Valle, Penonomé, the Canal Zone, and throughout eastern Panama. Also from the Bahamas, the Antilles, Mexico, Guatemala, Belize, Nicaragua, Trinidad, and Venezuela.

423. *Polypodium remotum* Desv. Mém. Soc. Linn. Paris 6:232. 1827.

Polypodium leucosticton Kunze ex Klotzsch, Linnaea 20:380. 1847. LECTOTYPE: Mérida, Edo. Mérida, Venezuela, *Moritz 336* (LZ destroyed?), inferentially chosen by Hieronymus (Bot. Jahrb. Syst. 34:521. 1904; Hedwigia 48:260. 1909).

Polypodium plebejum var. *columbiense* Kuhn, Abh. Naturf. Ges. Halle 11:40 (repr. 18). 1869, as “*columbiensis*.” TYPE: A renaming of *P. leucosticton* Kunze ex Klotzsch, and so based on the type of that name.

Polypodium microchasmum Baker, J. Bot. Brit. For. 25:44. 1887. TYPE: Tweeside, St. Andrew Parish, Jamaica, *Mrs. Baker* (K not seen Maxon photo 168; isotype IJ not seen).

Polypodium plebejum var. *palmense* Christ, Bull. Herb. Boissier II, 5:4. 1905. SYNTYPES: La Palma, Pcia. S. José, 1495 m, *Tonduz 12571* (P not seen); and Volcán Turrialba, Pcia. Cartago, 2500 m, *Pittier 13257* (P not seen).

Polypodium leucosticton var. *hartwegianum* Hieron. Hedwigia 48:260. 1909, as “*hartwegiana*.” SYNTYPES: Río Blanco near Popayán, Depto. Cauca, Colombia, *Stuebel 76* (B not seen); Near Silvia, Depto. Cauca, Colombia, *Stuebel 98* (B not seen); Mt. Tungurahua and near Baños, Pastaza Valley, Pcia. Tungurahua, Ecuador, *Stuebel 823, 830, 834* (all B none seen); and between Baños and Jivaria de Píntuc, Pastaza Valley, Pcia. Tungurahua, Ecuador, *Stuebel 975a* (B not seen).

TYPE: “Habitat in America calidiori,” *collector unknown* (P not seen Cintract photo).

Plants epiphytic, at (400)1100–2400 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Corillera de Talamasca to Pcia. Chiriquí, and Cerro Tute (Pcia. Veraguas). Also from Cuba, Jamaica, Hispaniola, Guatemala, Venezuela, and Colombia to Bolivia.

424. *Polypodium thyssanolepis* A. Braun ex Klotzsch, Linnaea 20:392. 1847.

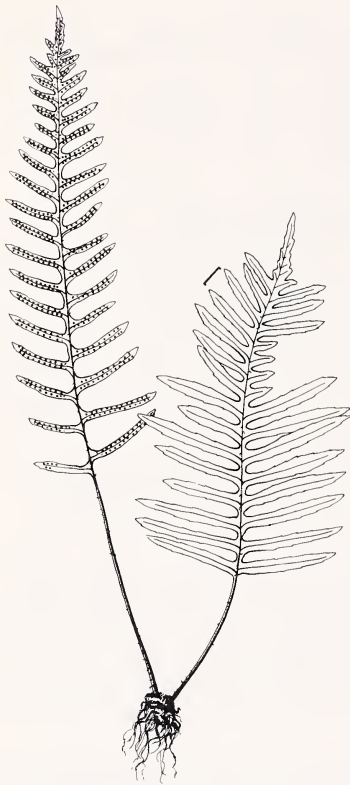
Polypodium rhagadiolepis Fée, Gen. Fil. [Mém. Foug. 5]:237. 1852. TYPE: Yerba Buena, Edo. Chiapas, Mexico, *Linden* (RB not seen).

Polypodium purpusii Christ, Bull. Herb. Boissier II, 7:416. 1907. TYPE: Pachuca, Distr. Zacoapan, Edo. Hidalgo, Mexico, 6000–7000 ft, *Purpus* in 1904 (P not seen; isotype US).

Polypodium incanum var. *fimbriatum* Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:36. 1842. LECTOTYPE: Barranca de Guadalajara, Edo. Jalisco, Mexico, *Galeotti 6438* (BR not seen; isotype P not seen), chosen by Morton (Contr. U. S. Natl. Herb. 38:257. 1973).

SYNTYPES: Venta Grande, Colombia, *Moritz 22* (B not seen; isosyntype P not seen); and Colombia, *Otto 896* (B not seen; isosyntype P not seen).

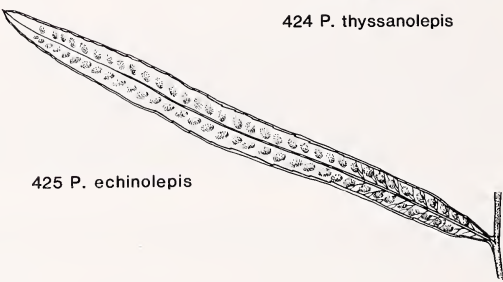
Plants epiphytic or rarely terrestrial, at 1000–1700 m elevation, in forests, along streams, and in open areas, from La Verbena (Pcia. S. José), Cerro Carpintera, the southern slopes of Volcán Irazú, and the valley of the Río Navarro (Pcia. Cartago). Also from the southwestern United States, Cuba, Jamaica, Hispaniola, Mexico, Guatemala, Honduras, Nicaragua, Venezuela, and Colombia to Bolivia.



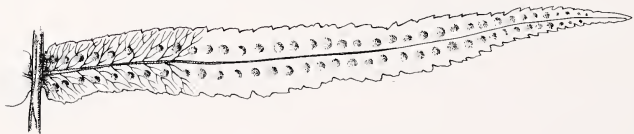
423 *P. remotum*



424 *P. thyssanolepis*



425 *P. echinolepis*



426 *P. fraternum*



427 *P. sororium*



428 *P. ursipes*

Wagner, Wagner, and Gómez (Brenesia 12/13:81–103. 1977) indicate that this species usually is diploid through much of its range, but is commonly tetraploid between Tres Rios and Cartago, which accounts for its ability to hybridize with *P. friedrichsthalianum* to form *P. aspidiolepis* in that area. Wagner & Wagner (Fern Gaz. 11:125–135. 1975) have found that this species also hybridizes with *Pleopeltis macrocarpa* var. *macrocarpa* to form *Pleopeltis* \times *leucospora*. In the Flora area this hybrid is known from the crater of Volcán Irazú (O. Jiménez 1155, US).

POLYPODIUM subg. POLYPODIUM

425. *Polypodium echinolepis* Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:87. 1857.

Polypodium sessilifolium Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:192 (repr. 40). 1849, non Desv., 1827, nom. illeg. TYPE: Barranca de Huitamalco, Edo. Veracruz, Mexico, *Liebm. Fl. Mex.* 697 (C not seen), examined by A. R. Smith (Fl. Chiapas 2:185. 1981).

Polypodium insigne Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:193 (repr. 41). 1849, non Blume, 1828, nom. illeg. LECTOTYPE: Hacienda de Mirador, Edo. Veracruz, Mexico, *Liebm. Fl. Mex.* 700 (C not seen), chosen by A. R. Smith (Fl. Chiapas 2:185. 1981).

Goniophlebium plectolepis Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:95. 1857. TYPE: Near Orizaba, Edo. Veracruz, Mexico, *Schaffner* 187 (P not seen).

Goniophlebium serratum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:95. 1857. TYPE: Orizaba, Edo. Veracruz, Mexico, *Schaffner* 495 (P not seen).

Polypodium macrodon Hook. Sp. Fil. 4:218. 1862. TYPE: Cobán, Depto. Alta Verapaz, Guatemala, *Salvin* (K not seen).

Polypodium legionarium Baker, Syn. Fil. 337. 1867, nom. superfl. TYPE: A renaming of *P. macrodon* Hook., and so based on the type of that name.

Polypodium subareolatum Christ, Bull. Soc. Bot. Genève II, 1:220. 1909. TYPE: Costa Rica, 2200 m, *Wercklé* (P not seen).

TYPE: Córdoba, Edo. Veracruz, Mexico, *Schaffner* 188 (RB not seen).

Plants epiphytic or on fallen trunks, at 1200–1800 m elevation, in forests, from Monteverde, near Zarcero (Pcia. Alajuela), and around Boquete. Also from Mexico, Guatemala, Honduras, and Nicaragua.

426. *Polypodium fraternum* Schlechtend. & Cham. Linnaea 5:608. 1830.

?*Polypodium henchmannii* J. Smith ex T. Moore & Houlst. Gard. Mag. Bot. 3:18. 1851. TYPE: Not stated.

Goniophlebium revertens Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:94. 1857. SYNTYPES: Huatusco, Edo. Veracruz, Mexico, *Schaffner* 189 (P or RB not seen; isosyntype K not seen); and Orizaba, Edo. Veracruz, Mexico, *Schaffner* 450 (P or RB not seen; isosyntype K not seen).

Polypodium petiolatum Davenp. Bot. Gaz. (Crawfordsville) 19:394. 1894. TYPE: Las Canoas, Edo. S. Luis Potosí, Mexico, *Pringle* 4001 (GH not seen; isotype VT not seen Maxon photo).

TYPE: Near Jalapa, Edo. Veracruz, Mexico, *Schiede & Deppe* [753] (B not seen; isotype LE not seen).

FIGS. 423–428. *Polypodium*. FIG. 423. Plant of *P. remotum*, von Tuerckheim, Guatemala. FIG. 424. Abaxial surface of pinna base of *P. thyssanolepis*, Torres R. 36. FIG. 425. Median pinna of *P. echinolepis*, Maxon 5724. FIG. 426. Median pinna of *P. fraternum*, Roe, Roe & Mori 584, Mexico. FIG. 427. Median pinna of *P. sororium*, von Wedel 807. FIG. 428. Median pinna of *P. ursipes*, Chrysler 5555.

Plants epiphytic, at 200 m elevation, in the Flora area known only from La Estrella, Pcia. Limón (Gómez *P.* 897, CR). Also from Mexico, Guatemala, Belize, and Honduras.

427. *Polypodium sororium* Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:191. 1810.

?*Goniophlebium elatum* Fée, Gen. Fil. [Mém. Foug. 5]:256. 1852. TYPE: Cuba, *Linden* 1890 (P or RB not seen).

Polypodium glycirrhiza Fée, Hist. Foug. Antill. [Mém. Foug. 11]:49. 1866, non D. C. Eaton, 1856, nom. illeg. TYPE: Guadeloupe, *L'Hermnier* in 1861 (P or RB not seen).

Polypodium endresii Baker, Ann. Bot. (London) 5:468. 1891. TYPE: Costa Rica, *Endres* (K not seen Maxon photo 240, fragm NY).

TYPE: Near Caripe, Edo. Monagas, Venezuela, Humboldt 424 (B-Hb. Willd. 19684-1 not seen microfiche S. I. Library).

Plants epiphytic or rarely epipetric, at 0–800(1300) m elevation, in forests, from La Palma de S. Ramón and the Zarcero region (Pcia. Alajuela), the northern slopes of the Cordillera Central, the Atlantic lowlands of Costa Rica and Panama, the Fila Costeña near S. Vito, between La Pintada and Coclecito (Pcia. Coclé), near Cerro Campana (Pcia. Panama), near Puerto Obaldía (Com. S. Blas), and the northern half of the Chocó. Also from the Antilles, Trinidad, Mexico, Guatemala, Venezuela, Colombia to Peru, and Surinam.

This species is rather variable in frond form throughout its extensive range. Specimens from the Chocó differ from those of the remainder of the range in being sparsely hairy on the axes, veins, and lamina surfaces, like *P. chnoophorum* Kunze. But they differ from that species in having laminae that are dark green, truncate, and fully pinnate at the base.

428. *Polypodium ursipes* Moritz ex C. Chr. Ind. Fil. 572. 1906.

Polypodium ursipes Moritz ex Kuhn, Linnaea 36:135. 1869, in synon.

Polypodium ambiguum Mett. ex Kuhn, Linnaea 36:134. 1869, non Desv., 1827, nom. illeg. LECTOTYPE: Near Colonia Tovar, Edo. Aragua, Venezuela, *Fendler* 254 (US), chosen by Lellinger (Proc. Biol. Soc. Wash. 98:387. 1985).

TYPE: A renaming of *P. ambiguum* Mett. ex Kuhn, and so based on the type of that name.

Plants epiphytic or on fallen logs, at (800)1800–3300 m elevation, in forests, from the Cordillera Central, Cerro Tablazo, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta Fé, and near El Valle. Also from El Salvador and Venezuela.

This species is very close to the Mexican *P. hartwegianum* Hook. in Benth., from which it differs in having densely puberulous stipes with the hairs all less than 0.2 mm long. The valid description on which *P. ursipes* is based is that of *P. ambiguum* Mett. ex Kuhn, under which "*P. ursipes* Moritz msc." is listed in synonymy.

56. PECLUMA M. G. Price

Plants epiphytic or terrestrial; rhizomes short-creeping, often with proliferous roots, scaly, the scales lanceolate, not clathrate, concolorous; stipes terete, articulate to low phyllopodia, glabrous or sparsely pubescent; fronds small to medium-sized, monomorphic; laminae pinnatisect, mostly elliptical to oblong or lanceolate, glabrous or sparsely or rarely densely pubescent on the abaxial surface, the rachis sparsely scaly in some species; segments long, narrow, usually linear, closely spaced, fully adnate and often decurrent or surcurrent on the rachis; veins free, mostly forked, sometimes casually to almost completely anastomosing; sori

sori usually medial on the segments, round, exindusiate; paraphyses sometimes present; sporangia long-stalked.

Neotropical; ca. 35 species.

EVANS, A. M. 1969. Interspecific relationships in the *Polypodium pectinatum*–*plumula* complex. *Ann. Missouri Bot. Gard.* 55:193–293.

PRICE, M. G. 1983. *Pecluma*, a new tropical American fern genus. *Amer. Fern J.* 73:109–116.

1. Rachises not scaly or with inconspicuous, hair-like scales..4.

1. Rachises sparsely to densely scaly with lanceolate to ovate scales..2.

2(1). Rachises black; rhizome scales narrowly lanceolate, acuminate; rachis scales inconspicuously toothed or fimbriate; sporangia setose. Laminae linear, 15–40(50) cm long, 3–7.5 cm wide, cuneate at the base or rarely subtruncate; segments 2–3 mm wide; veins 1(2)-forked, free.

438. *P. plumula*

2(1). Rachises brown or reddish-brown; rhizome scales broadly ovate, acute; rachis scales entire; sporangia not setose..3.

3(2). Laminae greatly tapered at the base, the basal segments gradually reduced to auricles, strongly deflexed; rachis scales narrowly elliptic-lanceolate, flat, few. Laminae narrowly oblong-elliptic, 8–35(40) cm long, 2–5(6) cm wide, cuneate to attenuate at the base; segments 2–3.5 mm wide, not uniformly long, the lamina outline often slightly irregular; veins 1-forked, free.

429. *P. alfredii*

3(2). Laminae slightly tapered at the base, the basal segments slightly reduced, but not to auricles, slightly or not deflexed; rachis scales broadly ovate-lanceolate, cordate, subbullate, many. Laminae narrowly oblong-elliptic, (6)15–45(50) cm long, (1.5)3–6(10) cm wide, cuneate to subtruncate at the base; segments 1.5–3 mm wide, not uniformly long, the lamina outline often slightly irregular; veins 1-forked, free.

433. *P. cupreolepis*

4(1). Laminae abaxially glabrous or nearly so..8.

4(1). Laminae abaxially pubescent throughout or in an oblong area surrounding each sorus..5.

5(4). Laminae pilose mostly in an oblong patch around the sorus. Laminae narrowly rhombic, attenuate at the base, acuminate at the apex, 20–90 cm long, (3)6–18 cm wide; segments 4–10 mm wide; veins 2- or 3-forked, free.

439. *P. ptilodon* var. *caespitosa*

5(4). Laminae evenly pubescent on the abaxial surface..6.

6(5). Veins 1-forked, free; laminae up to 25(35) cm long, pilose on the adaxial surface. Laminae narrowly elliptic, elliptic-lanceolate, or linear, truncate to acute at the base, 5–25(35) cm long, 1.5–4(6) cm wide; segments 2–5 mm wide; veins free.

436. *P. hygrometrica*

6(5). Veins (1)2-forked, partially to almost completely anastomosing; laminae usually at least 30 cm long, puberulous or glabrous on the adaxial surface..7.

7(6). Laminae abaxially sparsely puberulent with hairs shorter than 0.2 mm or glabrous; segments tapering from base to apex, the sinuses between them narrowly V-shaped. Laminae linear-lanceolate to linear-elliptic or narrowly rhombic, acuminate to occasionally subtruncate at the base, 20–50(70) cm long, 4–6(10) cm wide; segments 3–7 mm wide.

437. *P. pectinata*

7(6). Laminae abaxially rather densely pubescent with hairs 0.35–0.50 mm long; segments linear from distal to the base to the apex, the sinuses between them narrowly U-shaped. Laminae linear, obtuse or with a few auricles at the base, 15–40 cm long, 4–7 cm wide; segments 4–8 mm wide.

431. *P. camptophyllaria* var. *camptophyllaria*

8(4). Veins entirely free..10.

8(4). Veins partially to almost completely anastomosing..9.

9(8). Laminae (7)10–25 cm wide, truncate to acute at the base; veins only occasionally anastomosing. Laminae lanceate or sometimes elliptic-lanceolate, (25)35–100 cm long; segments 4–9 mm wide.

430. *P. divaricata*

9(8). Laminae 4–6(10) cm wide, acuminate to occasionally subtruncate at the base; veins often almost completely anastomosing. Laminae linear-lanceolate to linear-elliptic or narrowly rhombic, 20–50(70) cm long; segments 3–7 mm wide.

437. *P. pectinata*

10(8). Laminae 7–25 cm wide..12.

10(8). Laminae 3–7(9) cm wide..11.

11(10). Segments 2–3.5 mm wide; veins 1-forked; rhizome scales ovate-lanceolate, ca. 0.5–1 mm wide, not clathrate. Laminae narrowly oblong, 15–55 cm long, attenuate to cuneate at the base, the proximal segments reflexed.

429. *P. alfredii*

11(10). Segments 3.5–6 mm wide; veins (1)2-forked; rhizome scales linear-lanceolate, ca. 0.1–0.2 mm wide, decidedly clathrate. Laminae narrowly lanceolate with several pairs of auricles at the base, 25–50 cm long, cuneate to attenuate at the base, the proximal segments or auricles usually not reflexed.

432. *P. consimilis* var. *consimilis*

12(10). Rachis hairs on the adaxial surface ca. 0.2 mm long; rhizome scales densely fimbriate. Laminae lanceate or sometimes elliptic-lanceolate, (25)35–100 cm long; segments 4–9 mm wide; veins 2- or 3-forked.

430. *P. divaricata*

12(10). Rachis hairs at on the adaxial surface at least 0.5 mm long; rhizome scales entire or sparsely hirsute. Laminae narrowly lanceolate, 20–80 cm long; segments 3–9 mm wide; veins 1- or 2-forked..13.

13(12). Rachises abaxially rather densely villous, the surface somewhat obscure.

435. *P. eurybasis* var. *villosa*

13(12). Rachises abaxially sparsely pilose, the surface clearly visible.

434. *P. eurybasis* var. *glabrescens*

429. *Pecluma alfredii* (Rosenst.) M. G. Price, Amer. Fern J. 73:113. 1983.

Polypodium alfredii Rosenst. Repert. Spec. Nov. Regni Veg. 22:15. 1925. TYPE: Turrialba, Pcia. Cartago, 650 m, *Brade & Brade* 697 (S not seen photo 5936; isotype US).

Polypodium alfredii var. *curtii* Rosenst. Repert. Spec. Nov. Regni Veg. 22:15. 1925. TYPE: Río Chis region, near Juan Viñas, Pcia. Cartago, 1200 m, *Brade & Brade* 695 (S not seen; isotype US).

Polypodium tablazianum Rosenst. Repert. Spec. Nov. Regni Veg. 22:14. 1925. LECTOTYPE: Carpintera, Pcia. Cartago, 1500 m, *Brade & Brade* 149 (S not seen photo 6080; isolectotypes UC, US), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:727. 1977).

Polypodium cyathicola Copel. Univ. Calif. Publ. Bot. 19:292, t. 43. 1941. TYPE: Cuautlancillo, 10 km north of Orizaba, Edo. Veracruz, Mexico, 1600 m, *Copeland Mex. Ferns* 127 (MICH not seen; isotypes GH, UC, US).

Plants epiphytic, at 400–1300(1700) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Meseta Central, Cerro Tablazo, and the foothills at the northern end of the Cordillera de Talamanca. Also from Mexico to Honduras.

430. *Pecluma camptophyllaria* (Fée) M. G. Price, Amer. Fern J. 73:113. 1983, var. *camptophyllaria*.

Polypodium camptophyllum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]:86. 1857. TYPE: Near Ocaña, Depto. Norte de Santander, Colombia, *Schlim* 128 p. p. in 1850 (P not seen; isotypes BR not seen, G not seen, K not seen photo US).

Polypodium cinerascens Lindm. Ark. Bot. 1:238, t. 11, f. 6. 1903. LECTOTYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Regnell I 499* (S not seen; islectotypes BR, C, S none seen, US), chosen by Evans (Ann. Missouri Bot. Gard. 55:252. 1968).

Plants terrestrial or occasionally epiphytic, at 300–1000 m elevation, in forests and along roadsides, from near S. Ramón, the vicinity of Guápiles (Pcia. Limón), and El Valle. Also from the Greater Antilles, Nicaragua, Venezuela, Colombia, Peru, Bolivia, and Brazil.

431. *Pecluma consimilis* (Mett. in Tr. & Planch.) M. G. Price, Amer. Fern J. 73:113. 1983, var. *consimilis*.

Polypodium consimile Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:253 (repr. 335). 1864. TYPE: Ocaña, Pcia. Norte de Santander, Colombia, 6000–7000 ft, *Schlim 633* (B not seen; isotypes BR not seen, G not seen, L not seen photo 1849).

Polypodium consimile var. *minus* Hieron. Bot. Jahrb. Syst. 34:519. 1904, as “*minor*.” LECTOTYPE: Río Ambicá, Depto. Tolima, Colombia, 2000 m, *Lehmann 2353* (B not seen; islectotypes LE not seen, US), chosen by Evans (Ann. Missouri Bot. Gard. 55:261. 1968).

Polypodium pityrolepis Rosenst. Repert. Spec. Nov. Regni Veg. 22:16. 1925. TYPE: Río Chis, near Juan Viñas, Pcia. Cartago, 1200 m, *Brade & Brade 694* (S not seen; isotypes NY, US).

Plants terrestrial or on the bases of trees, at 1000–2000 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Jamaica, Hispaniola, Mexico, Guatemala, Venezuela, and Colombia.

432. *Pecluma cupreolepis* (Evans) M. G. Price, Amer. Fern J. 73:113. 1983.

Polypodium cupreolepis Evans, Ann. Missouri Bot. Gard. 55:224, f. 17. 1968. TYPE: Hills of Patzcuaro, Edo. Michoacán, Mexico, *Pringle 3353* (US; isotypes B not seen, GH, MICH not seen, MO, NY, UC).

Plants epiphytic or epipetric, occasionally terrestrial, at 600–2000 m elevation, from Las Nubes (Pcia. S. José), between Pacayas and Cot (Pcia. Cartago), and the vicinity of Pejivalle (Pcia. Cartago). Also from Mexico to Nicaragua.

This species is closely related to *P. alfredii*, and the two species may only merit varietal status.

433. *Pecluma divaricata* (Fourn.) Mickel & Beitel, Pterid. Fl. Oaxaca 269. 1988.

Polypodium divaricatum Fourn. Mexic. Pl. 1:80. 1872. TYPE: Zacuapán, Edo. Veracruz, Mexico, *Galeotti 6287* (P not seen; isotypes B not seen, G not seen photo 16671).

Polypodium bolivianum Rosenst. Repert. Spec. Nov. Regni Veg. 5:236. 1908. TYPE: Sirupaya, near Yanacachi, South Yungas, Depto. La Paz, Bolivia, 2300 m, *Buchtien 481* (S not seen photo 5958; isotypes P not seen, US).

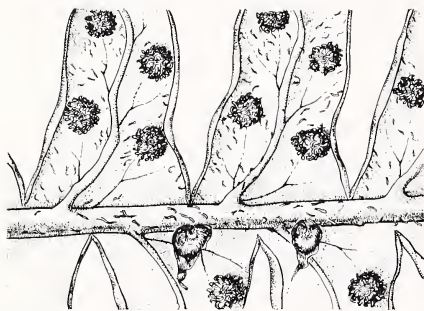
?*Polypodium bolivianum* var. *brevipes* Rosenst. Repert. Spec. Nov. Regni Veg. 12:473. 1913. TYPE: Polo-Polo, near Coroico, North Yungas, Depto. La Paz, Bolivia, 900 m, *Buchtien 3497* (S not seen).

Polypodium carpintera Rosenst. Repert. Spec. Nov. Regni Veg. 22:16. 1925. TYPE: La Carpintera, Pcia. Cartago, 1850 m, *Brade & Brade 14 p. p.* (S not seen).

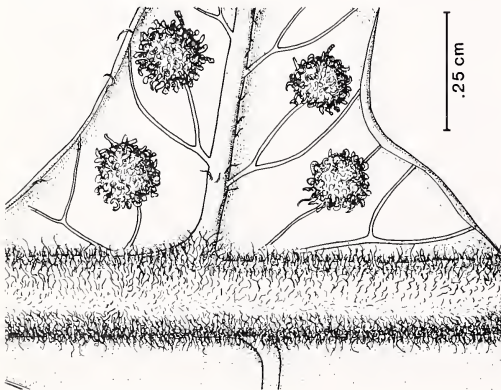
Plants epiphytic or rarely terrestrial, at (200)900–2600 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito de Java, above Sta. Fé, Cerro Campana (Pcia. Panama), Cana, and Alto del Buey. Also from Mexico to Honduras, Venezuela, and Colombia to Bolivia.



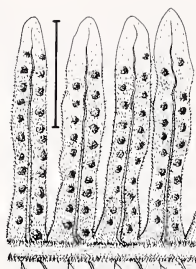
433 *P. divaricata*



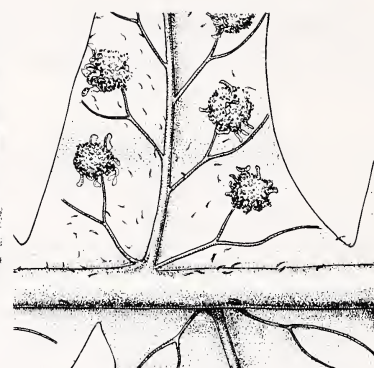
432 *P. cupreolepis*



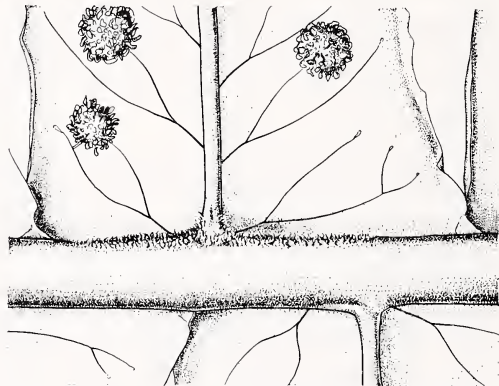
435 *P. eurybasis* var. *villosa*



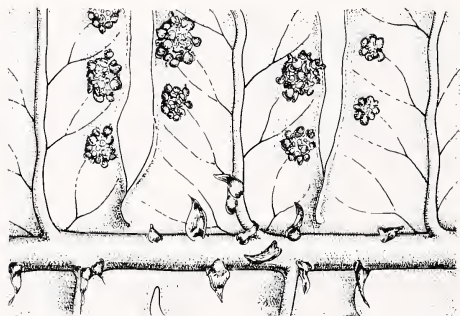
430 *P. camptophyllaria*
var. *camptophyllaria*



431 *P. consimilis* var. *consimilis*



434 *P. eurybasis* var. *glabrescens*



429 *P. alfredii*

In South America this species is distinct from *P. eurybasis* in its 2- or 3-forked veins and basal lamina segments 1/2 or more as long as the longest segments. In Central America, these characters distinguish the species less clearly.

434. *Pecluma eurybasis* var. *glabrescens* (Rosenst.) Lellinger, Amer. Fern J. 74:59. 1984.

Polypodium lachniferum var. *glabrescens* Rosenst. Repert. Spec. Nov. Regni Veg. 11:57. 1912. TYPE: Unduavi, Depto. La Paz, Bolivia, 3400 m, *Buchtien* 2770 (S not seen; isotype US).

Polypodium lachniferum f. *incurvatum* Rosenst. Repert. Spec. Nov. Regni Veg. 11:57. 1912, as "*incurvata*." TYPE: Unduavi, North Yungas, Depto. La Paz, Bolivia, 3400 m, *Buchtien* 2769 (S not seen; isotypes UC, US).

Plants epiphytic, at (800)1200–2400 m elevation, in forests, from La Palma de S. Ramón, between Moravia and Quebrada Platanillo (Pcia. Cartago), the Cerros de Zurquí (Pcia. Heredia), Las Nubes and the Laguna de la Chonta (Pcia. S. José), Cerro Horqueta (Pcia. Chiriquí), and the Río Mutatá at the foot of Alto del Buey. Also from Venezuela, Colombia, Ecuador, and Bolivia.

For a comment on this species, see *P. divaricata*.

435. *Pecluma eurybasis* var. *villosa* (Evans) Lellinger, Amer. Fern J. 74:59. 1984.

Polypodium eurybasis var. *villosum* Evans, Ann. Missouri Bot. Gard. 55:245. 1968. TYPE: Foothills above Bogotá, just north of the mouth of the Quebrada El Obispo, Depto. Cundinamarca, Colombia, 2700 m, *Fosberg* 19688 (US).

Plants epiphytic, at (800)1700–2600 m elevation, in forests, from the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, and Cerro Tacarcuna. Also from Venezuela and Colombia to Bolivia.

436. *Pecluma hygrometrica* (Splitg.) M. G. Price, Amer. Fern J. 73:115. 1983.

Polypodium hygrometricum Splitg. Tijdschr. Natuurl. Gesch. Physiol. 7:409. 1840. TYPE: Surinam, *Splitgerber* 1069 (L not seen photo 1890).

Polypodium pectinatum var. *caliense* Hieron. Bot. Jahrb. Syst. 34:517. 1904. TYPE: Near Las Juntas del Dagua, Depto. El Valle, Colombia, 300–1000 m, *Lehmann* 7668 (B not seen; isotypes LE not seen, US).

Polypodium truncatulum Rosenst. Repert. Spec. Nov. Regni Veg. 9:343. 1911. TYPE: Valley of the Río Espíritu Santo, Antahuacana, Depto. Cochabamba, Bolivia, 750 m, *Buchtien* 2168 (S not seen; isotype US).

Plants epiphytic, at 0–900 m elevation, in forests, from the Cordillera Central, the Atlantic coastal plain of Costa Rica, the valley of the Río General, the Canal Zone and vicinity, Cana, and the northern and central Chocó. Also from Mexico to Honduras, Nicaragua, Venezuela, Colombia, Peru, Bolivia, and Guyana.

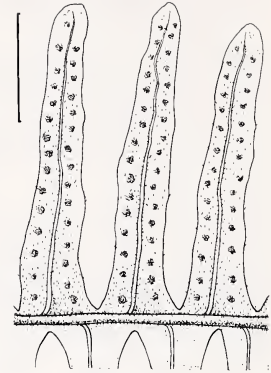
437. *Pecluma pectinata* (L.) M. G. Price, Amer. Fern J. 73:115. 1983.

Polypodium pectinatum L. Sp. Pl. 2:1085. 1753. TYPE: Plate 37 of Plumier's "Description...", which illustrates a specimen collected by Plumier on Martinique.

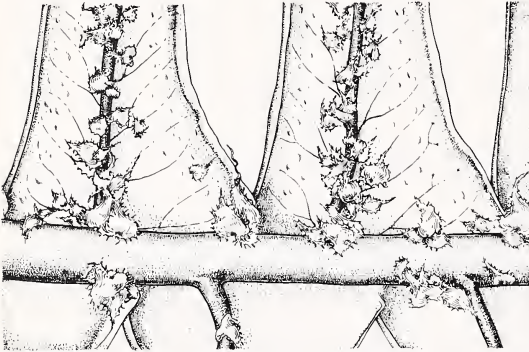
FIGS. 429–435. *Pecluma*. FIG. 429. Abaxial surface of portion of lamina of *P. alfredii*, Alfaro (J. D. Smith) 6056. FIG. 430. Segments of *P. camptophyllaria* var. *camptophyllaria*, Standley 37291. FIG. 431. Abaxial surface of portion of lamina of *P. consimilis* var. *consimilis*, Torres R. 54. FIG. 432. Abaxial surface of portion of lamina of *P. cupreolepis*, Standley 60040, Guatemala. FIG. 433. Abaxial surface of portion of lamina of *P. divaricata*, Maxon 5248. FIG. 434. Abaxial surface of portion of lamina of *P. eurybasis* var. *glabrescens*, Standley & Valerio 50346. FIG. 435. Abaxial surface of portion of lamina of *P. eurybasis* var. *villosa*, Maxon 5300.



436 *P. hygrometrica*



437 *P. pectinata*



438 *P. plumula*



441 *G. alsophilicola*



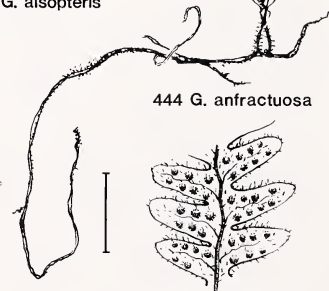
442 *G. alsopteris*



439 *P. ptilotodon* var. *caespitosa*



440 *G. alfarii*



444 *G. anfractuosa*

443 *G. ambigens*

Plants epiphytic, at 0–2100 m elevation, in forests, from the Cordillera Central, the Atlantic coastal plain of Costa Rica, the foothills of the northern end of the Cordillera de Talamanca, the valley of the Río General, Bajo Mona along the Río Caldera (Pcia. Chiriquí), Penonomé and vicinity, the Canal Zone, near Cana, and the central Chocó. Also from the Antilles, Venezuela, and Colombia to Peru.

438. *Pecluma plumula* (Humb. & Bonpl. ex Willd.) M. G. Price, Amer. Fern J. 73:115. 1983.

Polypodium plumula Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:178. 1810. LECTOTYPE: Caracas, Distr. Fed., Venezuela, *Bredemeyer* (B-Hb. Willd. 19655-1 not seen microfiche S. I. Library), chosen by Evans (Ann. Missouri Bot. Gard. 55:233. 1968).

Polypodium schkuhrii Raddi, Opusc. Sci. 3:287. 1819, as "*schkuri*." TYPE: Based on *P. pectinatum* sensu Schkuhr (Vier Zwanzigste Kl. Linn. Pfl.-Syst. 2:189, t. 17b. 1805), syn. excl., and so based on the basis of that name, which is the plate or specimen (now at HAL) from which the plate was drawn.

Polypodium elasticum Rich. ex Desv. Mém. Soc. Linn. Paris 6:233. 1827, non Bory ex Willd., 1810, nom. superfl. TYPE: A renaming of *P. plumula* Humb. & Bonpl. ex Willd., and so based on the type of that name. See Evans (Ann. Missouri Bot. Gard. 55:229. 1968) for an explanation of the nomenclatural complexities of this name.

Polypodium pulchrum Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:41, t. 8, f. 2. 1842. TYPE: Jalapa, Edo. Veracruz, Mexico, 4000 ft, *Galeotti 6332* (BR not seen photo 5023; isotypes BR not seen, K not seen photo 15430bis).

?*Polypodium inversum* Velloso, Fl. Flumin. 11:11, t. 72. 1831; Arq. Mus. Nac. Rio de Janeiro 5:448. 1881. TYPE: Based solely on Velloso's plate, there being no type specimens preserved. Of the four species Evans (Ann. Missouri Bot. Gard. 55:265. 1968) suggested, in stature, segmentation, and phytogeography, this is most likely a synonym of *P. plumula*, and certainly not of *P. filicula* Kaulf. nor of *P. sicca* Lindm.

Plants epiphytic, at 0–1900 m elevation, in forests, from the Meseta Central, Volcán Barba, Cerro Tablazo, and Bahía Honda (Pcia. Veraguas). Also from Florida and throughout most of tropical America.

439. *Pecluma ptilodon* var. *caespitosa* (Jenm.) Lellinger, Amer. Fern J. 77:101. 1988.

Polypodium pectinatum var. *caespitosum* Jenm. Bull. Bot. Dept. Jamaica N.S., 4:125. 1897. TYPE: Old England, St. Andrew Parish, Jamaica, 4000 ft, *Jenman* (NY not seen).

Plants terrestrial or occasionally epiphytic, at 0–100 m elevation, in forests, in the Flora area known only from the vicinity of Chiriquí lagoon, Pcia. Chiriquí (*von Wedel 2611*, MO, US) and Tres Bocas on the Río Coasi, Pcia. Darién (*Kirkbride & Duke 1383*, NY). Also from Florida, Cuba, Jamaica, Hispaniola, and Mexico to Honduras.

FIGS. 436–444. *Pecluma* and *Grammitis*. FIG. 436. Abaxial surface of portion of lamina of *P. hygrometrica*, Lellinger 671. FIG. 437. Segments of *P. pectinata*, Standley & Valerio 48712. FIG. 438. Abaxial surface of portion of lamina of *P. plumula*, Hitchcock. FIG. 439. Abaxial surface of portion of lamina of *P. ptilodon* var. *caespitosa*, von Wedel 2611. FIG. 440. Median portion of lamina of *G. alfarii*, Lellinger 998. FIG. 441. Median portion of lamina of *G. alsophilicola*, Lellinger & de la Sota 198. FIG. 442. Median portion of lamina of *G. alsopteris*, Killip & García 33706, Colombia. FIG. 443. Median portion of lamina of *G. ambigens*, Standley 34907. FIG. 444. Plant of *G. anfractuosa*, Maxon 8487.

57. GRAMMITIS Swartz

Plants mostly epiphytic, occasionally epipetric or on fallen logs; rhizomes mostly short-creeping to erect, conspicuously to inconspicuously scaly or rarely glabrous, the scales lanceolate, clathrate or not; stipes obsolete to longer than the laminae, wiry, inconspicuously articulate, not scaly or scaly only at the base, often long-setose throughout; fronds minute to medium-sized, monomorphic or rarely slightly dimorphic; laminae simple to pinnatisect (rarely more divided in sect. *Cryptosorus*), mostly linear, oblong, or elliptic, glabrous, sparsely setose, pilose, or pilosulous, or rarely glandular, the setae stiff to lax, short to long, mostly reddish-brown, sometimes confined to the sori; veins unbranched, forked, or pinnate, rarely irregularly anastomosing with a few included veinlets; sori terminal on a vein or vein branch, superficial or occasionally impressed, round or rarely oblong, exindusiate; paraphyses present or absent; sporangia long-stalked; spores trilete, commonly greenish.

Pantropical; ca. 400 species in the broad sense, including "*Cryptosorus*" and "*Xiphopteris*." The name "*Grammitis* sect.. *Xiphopteris* (Kaulf.) Presl" used below is the traditional name applied to this group of plants. This name is based on *Xiphopteris* Kaulf., which is a synonym of *Cochlidium*, and so cannot be correctly used in *Grammitis*. I do not wish to coin a new sectional name because *Grammitis* is being divided into several genera by L. E. Bishop and the current sectional names and concepts are not likely to continue in use.

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1. Fronds pinnatifid or pinnate, rarely only deeply lobed..3.

1. Fronds simple or shallowly lobed..2.

2(1). Laminae not black-bordered (sect. *Grammitastrum*)..9.

2(1). Laminae black-bordered (sect. *Grammitis*)..4.

3(1). Veins in the segments simple or 1-forked; laminae pinnatifid to pinnatisect, the segments about as long as wide ("sect. *Xiphopteris*")..10.

3(1). Veins in the segments pinnate, with several branches; laminae pinnatifid to pinnate-pinnatifid, the segments generally much longer than wide (sect. *Cryptosorus*)..23.

4(2). Laminae up to 3 mm wide; rhizome scales 2–6 cells wide at the base.

489a. *G. paramicola*

4(2). Laminae more than 3 mm wide; rhizome scales 8–12 cells wide..5.

5(4). Laminae sparsely setose on the surface and margins, the setae ca. 0.5 mm long. Fronds narrowly oblanceolate, 3–9 cm long including the stipes, 3–6 mm wide; sori discrete.

489. *G. marginella*

5(4). Laminae glabrous or nearly so..6.

6(5). Fronds 2.5–5 cm long; laminae spatulate, obtuse to round at the apex, the sterile veins forked. Laminae 3–8 mm wide, attenuate toward the base; sori discrete.

488. *G. leptopoda*

6(5). Fronds 5–20 cm long; laminae linear, acute or apiculate at the apex, the sterile veins simple..7.

7(6). Midrib of the fronds greenish on the abaxial surface in the basal half of the lamina, the sclerenchymatous sheath not exposed. Laminae 8–10(14) mm wide, attenuate toward the base; sori discrete to somewhat confluent laterally.

487. *G. bufonis*

7(6). Midrib of the fronds brownish on the abaxial surface in the basal half of the lamina, the sclerenchymatous sheath exposed; laminae 3–8 mm wide..8.

8(7). Border of the laminae 0.1–0.2 mm wide; midribs lacking many-branched hairs. Laminae 3–8 mm wide, attenuate toward the base; sori confluent or discrete.

486. *G. bryophila*

8(7). Border of the laminae usually up to 0.1 mm wide; midribs bearing minute, many-branched hairs, each branch multicellular, the cells pale except for the end walls. Laminae ca. 3 mm wide, attenuate at the base; sori confluent.

488a. *G. limbata*

9(2). Midrib obvious on the surface abaxially; laminae 2–4 mm wide; stipes 5–15 mm long; lamina setae apparently unicellular; rhizome scales absent. Laminae linear, attenuate at the base, 2–11 cm long.

484. *G. jungermannioides*

9(2). Midrib immersed in the lamina abaxially; laminae (3)4–5 mm wide; stipes up to 5 mm long; lamina setae obviously multicellular; rhizome scales ca. 1 mm long, 0.2 mm wide, setose like the laminae. Laminae linear, attenuate at the base, 3–9 cm long.

485. *G. sprucei*

10(3). Veins in the fertile segments 1-forked, with 2 hydathodes on the adaxial surface of the fertile segments..17.

10(3). Veins in the fertile segments simple, with 1 hydathode on the adaxial surface of the fertile segments..11.

11(10). Laminae not cut to the midrib, the segments laterally connate..13.

11(10). Laminae cut to the rachis, the segments discrete..12.

12(11). Laminae glabrous on the abaxial surface, except for a few setae on the rachis, the setae much shorter than the segments; rhizome scales clathrate, the lateral walls black. Laminae 2.5–11 cm long, 2–4(6) mm wide.

496. *G. limula*

12(11). Laminae strongly setose on the abaxial surface, mostly in the sori, the setae as long as the segments; rhizome scales not clathrate, all walls tan or yellowish. Laminae 2.5–9 cm long, 2–4 mm wide.

502. *G. zurquina*

13(11). Laminae monomorphic, all portions equally deeply lobed; rhizome scales not clathrate, brown or golden, or absent..15.

13(11). Laminae at least slightly dimorphic, the fertile portions less deeply lobed than the sterile ones; rhizome scales clathrate, eciliate..14.

14(13). Hairs on the abaxial surface of the rachis dark at maturity, setiform, 1-celled distal to a very short basal cell. Stipes up to 1 cm long; laminae 4–10 cm long, 2–3 mm wide.

498. *G. myosuroides*

14(13). Hairs on the abaxial surface of the rachis pale at maturity, lax, of 2–4 equally short cells. Stipes up to 1 cm long; laminae 4–10 cm long, 4–5 mm wide.

494. *G. delitescens*

15(13). Lateral margins of the segments parallel, the segments linear. Rhizome scales golden, eciliate. Stipes 1–2 cm long; laminae linear, attenuate at the base, acute at the apex, 5–14 cm long, 5–8 mm wide; fertile segments not gibbous; setae ca. 6 per segment.

492. *G. cookii*

15(13). Lateral margins of the segments not parallel, the segments rather triangular..16.

16(15). Lamina setae atropurpureous, thick and stiff; rhizome scales pale brown with atropurpureous setae; laminae subcoriaceous; axis of the segments at ca. a 75° angle to the midrib. Laminae 5–15 cm long, 4–7 mm wide.

491. *G. caucana*

16(15). Lamina setae stramineous, thin and flexible; rhizome scales absent; laminae membranaceous; axis of the segments at ca. a 45° angle to the midrib. Laminae 2–6 cm long, 3–4 mm wide.

499. *G. pseudomitchellae*

17(10). Laminae lobed or pinnatifid, not cut completely to the midrib; rhizome scales eciliate or with pale cilia (except cilia dark in *G. flabelliformis*)..19.

17(10). Laminae pinnatisect, cut completely to the rachis; rhizome scales with dark cilia..18.

18(17). Fertile pinnae strongly gibbous; sterile pinnae spaced about their width apart, 5–7(9) per cm; pinnae strongly decurrent. Laminae 4–14(18) cm long, (3)4–8(10) mm wide.

490. *G. blepharodes*

18(17). Fertile pinnae not gibbous or weakly so; sterile pinnae spaced less than their width apart, 7–9 per cm; pinnae weakly decurrent. Laminae (2.5)4–12 cm long, (3)5–7 mm wide.

493. *G. daguensis*

19(17). Laminae lobed usually ca. 1/2 the way to the midrib, with a broad, uncut, central portion; stipes obsolete. Rhizome scales clathrate, setose; laminae linear, 3–7 cm long, 5–10 mm wide, finely setose on both surfaces, the setae reddish-brown.

501. *G. truncicola*

19(17). Laminae lobed usually more than 3/4 the way to the midrib, with a narrow, uncut, central portion; stipes obvious..20.

20(19). Laminae lacking long, dark setae; sporangia with many short, pale setae. Laminae 2–7 cm long, 3–5 mm wide; segments ascending at ca. a 30–45° angle to the midrib.

497. *G. mitchellae*

20(19). Laminae with long, dark setae; sporangia glabrous..21.

21(20). Segments at a 75–90° angle to the midrib. Segments approximate to subimbricate.

494a. *G. flabelliformis*

21(20). Segments at a 60–75° angle to the midrib..22.

22(21). Laminae 2–8(13) cm long, 3–5(7) mm wide; segments ascending at ca. a 60° angle to the midrib.

500. *G. setulosa*

22(21). Laminae (7)10–15 cm long, 6–9 mm wide; segments slightly ascending, at ca. a 75° angle to the midrib.

495. *G. hyalina*

23(3). Stipes and laminae (or their hairs) glandular (also thinly pilose in *G. nubigena*), the glands sessile, spherical or elongate, whitish (*G. jamesonioides* group)..34.

23(3). Stipes not glandular, the laminae rarely so..24

24(23). Stipes broadly alate nearly to the base, the ala 1–2(3) mm wide at the stipe apex, tapered gradually below (*G. fucoides* group)..35.

24(23). Stipes exalate or with a narrow ala usually only at the apex..25.

25(24). Fronds pilose or setose, at least in the sori or on the stipes..28.

25(24). Fronds glabrous, the stipes sometimes hirsutulous..26.

26(25). Sori in shallow depressions and supramedial or in rather deep cavities and submarginal (*G. subcapillaris* group)..37.

26(25). Sori superficial and medial..27.

27(26). Laminae papyraceous to membranaceous, the margins plane; segments at least (2)3 times longer than wide (except shorter in *G. phlegmaria*) (*G. suprasculpta* group)..41.

27(26). Laminae coriaceous, the margins revolute; segments no more than 2(2.5) times longer than wide (*G. moniliformis* group)..46.

28(25). Fronds pilose to weakly sericeous, with thin, flexible, pale, long hairs; fronds papyraceous to membranaceous, flexible, often entirely pendent..33.

28(25). Fronds setose, with rather thick, stiff, dark brown to reddish-brown setae; fronds coriaceous to herbaceous, stiff, erect or the laminae pendent from stiff, spreading stipes..29.

29(28). Laminae coriaceous; segment margins strongly revolute; rhizome scales clathrate, entire, often iridescent; rhizomes very long-creeping in most species (*G. moniliformis* group)..46.

29(28). Laminae subcoriaceous to herbaceous; segment margins not or scarcely revolute; rhizome scales not clathrate or clathrate with whitish setae (except clathrate and lacking setae in *G. firma*)..30.

30(29). Stipes equalling or exceeding the rachises (except in *G. ambigens* and *mathewsii*); laminae not or only slightly tapered at the base, truncate; segments mostly 4 mm wide or more, tapering from the base to the apex. Midribs not black; rhizome scales golden, brown, or reddish-brown, not clathrate, often of several files of bulging cells and bristle-tipped (*G. meridensis* group)..51.

30(29). Stipes much shorter than the rachises; laminae tapered at the base, obtuse to acute; segments mostly less than 3.5(5) mm wide, linear (except in *G. pruinosa* and *staheliana*)..31.

31(30). Segments often tapered, 1–3 times longer than wide; midribs and veins occult; lime dots not present on the adaxial surface; laminae less than 10 cm long (*G. staheliana* group)..57.

31(30). Segments linear, many times longer than wide..32.

32(31). Midribs and veins occult; lime dots absent on the adaxial surface of the laminae (*G. pilipes* group).

467b. *G. pilipes*

32(31). Midribs and often the veins black or dark brown; lime dots common on the adaxial surface; laminae mostly more than 10 cm long (*G. taxifolia* group)..58.

33(28). Stipes more than 5 cm long; laminae mostly abrupt at the base, truncate to obtuse; laminae barely cut to the midrib, the segments mostly slightly connate laterally (*G. asplenifolia* group)..63.

33(28). Stipes less than 2 cm long; laminae mostly tapered at the base, acute to attenuate; laminae mostly cut to the rachis, the segments not at all connate laterally (*G. cultrata* group)..66.

34(23). Stipes and laminae lacking setae; glands usually elongate, abundant. Rhizome scales ovate, not clathrate, brownish-orange, entire or sparsely setose; laminae linear, attenuate at the base, acuminate or acute at the apex, 5–18(31) cm long, 0.5–1.8(2.7) cm wide, the segments ascending, entire to shallowly lobed.

456. *G. jamesonioides*

34(23). Stipes and laminae sparsely setose; glands usually spherical, sparse. Rhizome scales lanceate, not clathrate, brown or reddish-brown, entire; laminae elliptic, acute at the base and apex, 8–12 cm long, 2.5–5 cm wide, the segments ascending, shallowly crenate-lobed.

467. *G. nubigena*

35(24). Sori supramedial; stipe ala strongly undulate; rhizome scales clathrate, black with abundant, short, whitish setae. Laminae elliptic-oblongate, 7–15(26) cm long, 3–7.5(10) cm wide; segments decurrent, sometimes surcurrent, 1–5 cm long, 2–4 mm wide.

476. *G. subsessilis*

35(24). Sori nearly marginal; stipe ala entire; rhizome scales not clathrate, brownish to golden with none or few, long, dark setae..36.

36(35). Sori not on marginal teeth; segments entire or furcate, sometimes repeatedly so. Rhizome scales lanceolate, brownish; laminae linear to narrowly elliptic, up to 60 cm long, 4–12(25) cm wide; segments 2–3.5 mm wide.

454. *G. fucoides*

36(35). Sori on prominent, marginal teeth; segments entire or sometimes furcate, rarely repeatedly so. Rhizome scales ovate-lanceolate, golden; laminae linear to elliptic-lanceolate, up to 45 cm long, 4–15 cm wide.

469. *G. podocarpa*

37(26). Rhizome scales ciliate; stipes at least (2)3 cm long, densely hirsutulous..39.

37(26). Rhizome scales eciliate; stipes up to 2(3) cm long, glabrous..38.

38(37). Segments mostly spreading, the acroscopic segment margins inserted at a 90° angle to the rachis. Laminae linear-elliptic, attenuate at the base, acuminate at the apex, 5–25(30) cm long, 1–2.5 cm wide.

475. *G. subcapillaris*

38(37). Segments mostly slightly ascending, the acroscopic segment margins inserted at a 75° angle to the rachis (the largest segments often somewhat gibbous). Laminae linear-elliptic, attenuate at the base, acuminate at the apex, 4–17 cm long, (0.5)1–1.5(2.2) cm wide.

479. *G. suspensa*

39(37). Laminae pinnatifid, not cut quite to the midrib, the midrib subglabrous abaxially, not hirsutulous. Laminae linear-elliptic, 4–14 cm long, 1–2 cm wide, attenuate at the base, acuminate at the apex; segments strongly decurrent, ascending at a 60° angle to the rachis.

455. *G. isidrensis*

39(37). Laminae pinnatisect, cut to the rachis, the rachis hirsutulous abaxially..40.

40(39). Segments linear, decurrent, 1–2 cm long; laminae 5–15(21) cm long, 1.2–3.8 cm wide, apiculate at the apex. Laminae linear-elliptic, slightly tapering and obtuse at the base; segments (1)1.5–2(2.5) mm wide, decurrent, at a 75–90° angle to the rachis.

445. *G. apiculata*

40(39). Segments oblong, slightly decurrent, 0.5–1 cm long; laminae 2–5 cm long, 0.5–1 cm wide, acute at the apex. Laminae linear, obtuse to acute at the base; segments 1.5–2.5 mm wide, at a 45–60° angle to the rachis.

452. *G. epiphytica*

41(27). Segments entire or slightly repand..43.

41(27). Segments crenately or serrately lobed..42.

42(41). Rhizome scales eciliate. Laminae linear, 7–30(40) cm long, (1)1.5–3(6) cm wide, attenuate at the base, acute at the apex; segments decurrent, lanceate, serrately lobed.

478. *G. suprasculpta*

42(41). Rhizome scales with long, pale cilia. Laminae linear, 3–23 cm long, 0.7–3 cm wide, acuminate at the base, acute to acuminate at the apex; segments decurrent, oblong, deeply serrately lobed.

463. *G. micula*

43(41). Segments nearly linear, 4–10 times longer than wide; rhizome scales clathrate with occluded lumina; rachises often flexuous toward the apex. Laminae linear, 8–21(32) cm long, 0.6–2.5 cm wide, attenuate at the base, acute at the apex; segments decurrent, ascending at ca. a 45° angle to the rachis.

481. *G. tnesipteris*

43(41). Segments rather triangular, mostly less than (4)5 times longer than wide; rhizome scales clathrate with rather clear lumina; rachises not flexuous toward the apex..44.

44(43). Rachises with bifid or stellate hairs on the abaxial surface. Laminae linear, 2–5 cm long, 0.4–0.8 cm wide, attenuate at the base, obtuse at the apex.

470. *G. randallii*

44(43). Rachises glabrous on the abaxial surface or with simple hairs..45.

45(44). Rhizome scales distantly setose, the setae straight, sharp, ca. 0.2 mm long; segments mostly (2)3–5(8) times longer than wide. Laminae linear, 4–14 cm long, 1–2 cm wide, attenuate at the base, acute at the apex; segments spreading at a 60–75° angle to the rachis.

448. *G. barbensis*

45(44). Rhizome scales not setose; segments mostly ca. as long as wide. Laminae linear, 10–15 cm long, 0.5–1.2 cm wide, attenuate at the base, obtuse or broken at the apex.

467a. *G. phlegmaria*

46(27,29). Abaxial lamina surface setose, especially in the sori, the setae long, reddish; segments more than 2 times longer than wide (except sometimes in *G. anfractuosa*)..48.

46(27,29). Abaxial lamina surface glabrous; segments less than 2 times longer than wide..47.

47(46). Rhizome scales more than 12 cells wide, 3–5(8) mm long, 0.5–1(2) mm wide, iridescent, the lateral cell walls rather thin, reddish. Stipes glabrous or occasionally sparsely setose; laminae linear, 4–15(20) cm long, 0.5–1.4 cm wide.

465. *G. moniliformis*

47(46). Rhizome scales up to 6 cells wide, 1.5–2 mm long, 0.2–0.3 mm wide, not iridescent, the lateral cell walls very thick, blackish. Stipes glabrous; laminae linear, 4–13 cm long, 0.5–1.2 cm wide.

461. *G. melanosticta*

48(46). Rhizomes ca. 1 mm in diam., short, erect, distant along wide-creeping, proliferous roots. Stipes sparsely setose; laminae linear-elliptic, 2–8(11) cm long, 0.4–1 cm wide.

444. *G. anfractuosa*

48(46). Rhizomes 1–3(5) mm in diam., long-creeping to erect-ascending, without proliferous roots..49.

49(48). Rhizome scales ovate-lanceolate, 1–2 mm (ca. 24 cells) wide; rhizomes very long-creeping. Lateral and end clathrate cell walls of the rhizome scales equally thin; laminae linear-elliptic, 8–20 cm long, 1.2–1.9 cm wide, not curling when dry.

471. *G. rigescens*

49(48). Rhizome scales linear-lanceolate, 0.5–1 mm (6–10 cells) wide; rhizomes short-creeping to erect-ascending..50.

50(49). Segments spreading, obtuse to round at the apex; sterile segments glabrous abaxially; lateral clathrate cell walls of the rhizome scales thicker than the end walls; laminae often curling when dry. Laminae linear-elliptic or linear-lanceolate, 5–15(23) cm long, (0.7)1–2.5 cm wide.

482a. *G. xiphopteroides*

50(49). Segments ascending, acute at the apex; sterile segments long-setose abaxially; lateral clathrate cell walls of the rhizome scales as thick as the end walls. Laminae (5)10–16 cm long, (0.8)1–2(2.3) cm wide.

468. *G. pilosissima*

51(30). Segments strongly ascending, at a (20)30–45° angle to the rachis, 5–15(25) cm long. Rhizome scales golden to brown, entire; laminae ovate, triangular, or occasionally oblanceolate, 10–25 cm long, 5–15 cm wide; segments 4–6 mm wide, the venation partially areolate.

472. *G. sectifrons*

51(30). Segments spreading, at a 75–90° angle to the rachis, 0.5–4.5(6) cm long..52.

52(51). Rhizome scales reddish-brown or rarely brown, with copious, short, pale setae or fewer, long, reddish-brown setae..55.

52(51). Rhizome scales brown, entire or with a few brown setae..53.

53(52). Lamina segments (2)3–5 mm wide; rhizome scales usually sparsely setose; sori with branched glands having enlarged, terminal cells; venation free. Laminae triangular to oblong, 6–19(23) cm long, 2–8(10) cm wide.

457. *G. kalbreyeri*

53(52). Lamina segments (3)5–8 mm wide; rhizome scales entire; sori eglandular; venation areolate..54.

54(53). Laminae not setose abaxially or on the margins; stipes mostly as long as the rachises. Laminae narrowly oblong, (4)8–25 cm long, (4)6–9(12) cm wide.

450. *G. cornuta*

54(53). Laminae setose abaxially and on the margins; stipes mostly 0.5–0.75(1) times as long as the rachises. Laminae narrowly lanceolate, 15–45 cm long, 5–10 cm wide.

459a. *G. mathewsii*

55(52). Rhizome scales sparsely setose with long, dark, marginal setae; laminae usually less than 10 cm long; stipes usually shorter than the laminae. Laminae narrowly lanceolate, 3.5–10 cm long, 1.2–3 cm wide, with long, soft, reddish setae on both surfaces.

443. *G. ambigens*

55(52). Rhizome scales densely setose with short, pale, marginal setae; laminae usually more than 10 cm long; stipes usually longer than the laminae..56.

56(55). Segments entire, obviously decurrent, spaced less than their width apart. Laminae oblong or lanceate, 4–23 cm long, 1–5.5 cm wide.

462. *G. meridensis*

56(55). Segments crenate, not decurrent, often spaced more than their width apart. Laminae oblong, 5–37 cm long, 1–5 cm wide.

460. *G. mayoris*

57(31). Laminae pinnatifid, cut almost to the midrib, the lobes narrowly triangular to oblong; setae on the sporangia conspicuous, much longer than the capsules; laminae 3–10 cm long, 0.6–2 cm wide; rhizome scales pale brown with abundant setae; stipes and rachises sparsely long-setose; laminae elliptic to linear-elliptic, acute to acuminate at the base, acuminate at the apex.

474. *G. staheliana*

57(31). Laminae lobed, with a broad, uncut central portion, the lobes broadly triangular; setae on the sporangia few and inconspicuous, not longer than the capsules. Laminae 2–6 cm long, 0.7–1 cm wide; rhizome scales pale brown with scattered setae; stipes and midribs sparsely long-setose; laminae linear-elliptic, acuminate at the base, acute at the apex.

469a. *G. pruinosa*

58(32). Laminae pinnate-pinnatifid. Laminae oblong, 12–15 cm long, 3.5–4 cm wide.

466. *G. myriophylla*

58(32). Laminae pinnatifid or pinnatisect..59.

59(58). Laminae rather densely hirsutulous on the abaxial surface. Rhizome scales reddish-brown with a terminal and sometimes a few lateral setae ca. 1 mm long; stipes and rachises sparsely long-setose; laminae linear-elliptic, 18–30 cm long, 2–5 cm wide, acuminate at the base, caudate at the apex, segments linear, spreading to slightly ascending, with adaxial lime dots, the costa visible on the abaxial surface; sporangia glabrous.

442. *G. alsopeteris*

59(58). Laminae glabrous on the abaxial surface (sometimes circumsorally sparsely hirsutulous in *G. taxifolia*)..60.

60(59). Segment costae, but not the veins, clearly visible abaxially; laminae caudate at the apex. Rhizome scales blackish, clathrate, entire; stipes and rachises sparsely setose; laminae linear-elliptic, 3–18 cm long, 0.6–4.5 cm wide, acuminate at the base, caudate at the apex.

453. *G. firma*

60(59). Segment costae and the veins both clearly visible abaxially; laminae not caudate at the apex..61.

61(60). Segment margins entirely glabrous. Rhizome scales eciliate; stipes setose, more densely so toward the base; laminae linear-elliptic, 7–31 cm long, 2–6(8) cm wide, acuminate at the apex, acute or rarely obtuse or acuminate at the base.

483. *G. zeledoniana*

61(60). Segment margins sparsely setose toward the apex..62.

62(61). Rhizome scales sparsely long-ciliate; stipes setose, more densely so at the base. Stipes 3–15 cm long; laminae linear-elliptic, 6–30(40) cm long, 2–5 cm wide.

473. *G. semihirsuta* var. *semihirsuta*

62(61). Rhizome scales entire; stipes evenly setose throughout. Stipes 2–7 cm long; laminae linear-elliptic, 6–16(20) cm long, 2–3.5(5) cm wide.

480. *G. taxifolia*

63(33). Rhizome scales dull, reddish-brown to stramineous, with obscure cells about as long as wide and dense setae often paler than the body of the scales; sporangia glabrous (except in *G. lehmanniana*)..65.

63(33). Rhizome scales shiny, reddish-brown, with obvious cells several times longer than wide and setae about the same color as the body of the scales; sporangia setose..64.

64(63). Stipes 0.3–0.8 mm in diam., atropurpureous, sparsely setose; laminae 2–3(4) cm wide. Stipes (5)9–21 cm long, often horizontal with the laminae pendent; laminae lanceolate, (6)10–40 cm long, obtuse at the base, acute to acuminate at the apex.

446. *G. asplenifolia*

64(63). Stipes 1–1.5 mm in diam., gray or brown, densely setose; laminae (3.5)4–7 cm wide. Stipes 10–26 cm long; laminae lanceolate, 15–50 cm long, acute at the base, acuminate at the apex.

449. *G. chrysleri*

65(63). Segments with short, pale setae on the abaxial surface (these sometimes partly deciduous), usually 5 mm or less wide; sporangia setose; stipes 0.25–0.75 mm in diam. Laminae linear, 10–35(50) cm long, 2–5(8) cm wide, obtuse to truncate at the base.

459. *G. lehmanniana*

65(63). Segments glabrous on the abaxial surface, usually more than 5 mm wide; sporangia not setose; stipes 1–1.5 mm in diam. Laminae linear, 8–35(65) cm long, 3.5–9 cm wide, obtuse to truncate at the base.

447. *G. atroviridis*

66(33). Sericeous hairs along the segment margins all simple or absent..70.

66(33). Sericeous hairs along the segment margins partially or entirely paired or sessile-stellate..67.

67(66). Hairs on the abaxial surface of the laminae sericeous, mostly sessile-stellate, those on the rachis often reddish-brown. Rhizome scales ciliate; laminae linear, (8)15–40(60) cm long, (1.5)4–6 cm wide, acuminate at the base, acute to acuminate at the apex; segments (3)4–5(6) cm wide, gray-green, broadly adnate, the acroscopic margins often nearly surcurrent, the marginal hairs mostly sessile-stellate; sporangia short- to long-setose.

458. *G. lanigera* var. *lanigera*

67(66). Hairs on the abaxial surface of the laminae simple, entirely pale..68.

68(67). Hairs on the segment margins simple or sometimes paired; segments more than 4 times longer than wide. Rhizome scales absent; laminae linear or in small fronds elliptic, 8–40 cm long, 2–7 cm wide, acute to acuminate at the base and apex; segments linear, 2–4 mm wide, not or slightly decurrent, not surcurrent; sporangia short-setose or glabrous.

482. *G. turrialbae*

68(67). Hairs on the segment margins sessile-stellate or paired; segments ca. 2–2.5 times longer than wide..69.

69(68). Rhizome scales ciliate. Laminae linear, (3.5)6–55 cm long, 0.7–3.5(4) cm wide, acuminate to attenuate at the base, acute at the apex; segments 2–6.5 mm wide, yellow-green or pale green, decurrent at the base, the acroscopic margin curving proximally to meet the rachis; sporangia short- to long-setose.

451. *G. cultrata*

69(68). Rhizome scales absent. Laminae linear, 3–22 cm long, 0.5–1.5 cm wide, acute at the base and apex; segments 2–3 mm wide, pale green, decurrent at the base, the acroscopic margin curving proximally to meet the rachis; sporangia short- to long-setose.

464. *G. mollissima*

70(66). Laminae decidedly sericeous on the abaxial surface and veins. Rhizome scales ca. 1 mm long, 0.3 mm wide, dark brown with whitish setae; laminae 2–12 cm long, 5–10(12) mm wide, linear, acuminate to attenuate at the base, acute at the apex, with adaxial lime dots; segments not or only slightly gibbous, often less than 3 times longer than wide, parallel-sided, membranaceous; sporangia glabrous.

477. *G. subtilis*

70(66). Laminae glabrous or nearly so on the abaxial surface..71.

71(70). Segments strongly gibbous, almost triangular, glabrous on the abaxial surface; rhizome scales absent. Laminae 3–25 cm long, (0.5)1–2(3) cm wide, linear, acuminate at the base, acute at the apex; segments membranaceous; sporangia not setose.

440. *G. alfarii*

71(70). Segments not or only slightly gibbous, essentially parallel-sided, sparsely sericeous on the abaxial surface; rhizome scales ovate-lanceolate, ca. 1 mm long, 0.5 mm wide, gray with reddish-brown setae 1–2 mm long. Laminae (5)10–30 cm long, 1.5–2.5 cm wide, linear, obtuse or acute at the base, acute at the apex; segments papyraceous; sporangia decidedly long-setose.

441. *G. alsophilicola*

GRAMMITIS sect. CRYPTOSORUS (Fée) Tryon & Tryon

440. *Grammitis alfarii* (J. D. Smith) Morton, Contr. U. S. Natl. Herb. 38:103. 1967.

Polypodium oligosorum Mett. ex Kuhn, Linnaea 36:132. 1869, non Klotzsch, 1847, nom. illeg. SYNTYPES: Colonia Tovar, Edo. Aragua, Venezuela, *Moritz* 460 (B not seen fragm US); and Venezuela, *Fendler* 208 (B not seen), *Karsten* 10 (B not seen).

Polypodium alfarii J. D. Smith, Bot. Gaz. (Crawfordsville) 33:262. 1902. TYPE: Sierra Alta de Navarro, Pcia. Cartago, 2000 m, *Alfaro* 73 (*J. D. Smith* 8063) (US).

Plants epiphytic, at (800)1000–2700 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, the vicinity of S. Isidro del General, the Cordillera de Talamanca to Pcia. Chiriquí, and Cerro Campana. Also from Venezuela, Colombia, and Ecuador.

441. *Grammitis alsophilicola* (Christ) F. Seym. Phytologia 31:176. 1975.

Polypodium alsophilicola Christ, Bull. Soc. Bot. Genève II, 1:219. 1909, as “*alsophilicolum*.” TYPE: Vallée du Copal, Pcia. Puntarenas, *Pittier* 10971 (P not seen; isotype US).

Plants epiphytic, at 0–900 m elevation, in forests, from the valley of the Río General and coastal southern Costa Rica, El Valle, near El Llano on the road to Cartí (Pcia. Panama), Cana and the Sambú basin (Pcia. Darién), and Alto del Buey and environs. Also from other localities in Colombia.

442. *Grammitis alsopteris* Morton, Contr. U. S. Natl. Herb. 38:112, t. 4. 1967.

TYPE: Hacienda La Mascota, Canton Mera, Pcia. Napo-Pastaza, Ecuador, 900 m, *Mexía* 7013 (US; isotype UC).

Plants epiphytic, at (100)500–1700 m elevation, in forests, from the northwestern slopes of the Cordillera Central, the vicinity of S. Isidro del General, the Fila Costeña near S. Vito de Java, near El Valle, Cerro Campana, Cerro Tacarcuna, and Alto del Buey and the upper Río Truando (Depto. Chocó). Also from Colombia and Ecuador.

443. *Grammitis ambigens* (Copel.) F. Seym. Phytologia 31:176. 1975.

Ctenopteris ambigens Copel. Philipp. J. Sci. 84:460, t. 13. 1956. TYPE: Volcán Turrialba, near the Finca del Volcán de Turrialba, Pcia. Cartago, ca. 2000–2400 m, *Standley* 35215 (US).

Ctenopteris knightii Copel. Philipp. J. Sci. 84:419, t. 6. 1956. TYPE: Las Nubes to La Palma, Pcia. S. José, *Knight* 29359 (US).

Plants epiphytic, at 1800–2900 m elevation, in forests, from the Cordillera Central.

In the new genus *Ceradenia*, the correct name of this species is *C. knightii* (Copel.) L. E. Bishop.

444. *Grammitis anfractuosa* (Kunze ex Klotzsch) Proctor, Rhodora 63:35. 1961.

Polypodium anfractuosum Kunze ex Klotzsch, Linnaea 20:375. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz* 330 (B not seen; isotype US).

Polypodium monticola Klotzsch, Linnaea 20:377. 1847. SYNTYPES: Pano, Villao, Muña, Depto. Huánuco, Peru, Ruiz 58 (B not seen); and Mérida, Edo. Mérida, Venezuela, Moritz 383 (B not seen fragm and photo US).

Polypodium saxicola Baker, J. Bot. Brit. For. 15:264. 1877, non Swartz, 1817, nom. illeg. TYPE: Jamaica, Jenman 84 in 1877 (K not seen).

Polypodium induens Maxon, Bull. Torrey Bot. Club 32:75. 1905. TYPE: A renaming of *Polypodium saxicola* Baker, and so based on the type of that name.

Plants epiphytic, at (700)1000–2500 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, and Alto del Buey. Also from Cuba, Jamaica, Hispaniola, Mexico, Guatemala, Honduras, Venezuela, Colombia to Peru, and Mt. Roraima, Brazil.

445. *Grammitis apiculata* (Kunze ex Klotzsch) F. Seym. Phytologia 31:176. 1975.

Polypodium apiculatum Kunze ex Klotzsch, Linnaea 20:378. 1847. SYNTYPES: Guyana, Rich. Schomburgk 1213 (B not seen); and Colonia Tovar, Edo. Aragua, Venezuela, Moritz 247 (B not seen; isosyntype US).

Polypodium pecten Fée, Gen. Fil. [Mém. Foug. 5]:240. 1852. TYPE: Mérida, Edo. Mérida, Venezuela, Linden 239 (P or RB not seen).

Polypodium pectinellum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:61, t. 27, f. 2. 1857. TYPE: Mérida, Edo. Mérida, Venezuela, Moritz 239 (P not seen).

?*Polypodium confluens* Fée, Crypt. Vasc. Brésil 1:89, t. 26, f. 3. 1869, non R. Br., 1810, nom. illeg. TYPE: Brazil, Glaziou 2413 (P or RB not seen).

Plants epiphytic, at 500–1500 m elevation, in forests, from the Cordillera Central and the valley of the Río General. Also from Mexico, Honduras, Venezuela, Colombia, Peru, and Brazil.

446. *Grammitis asplenifolia* (L.) Proctor, Brit. Fern Gaz. 9:76. 1962.

Polypodium asplenifolium L. Sp. Pl. 2:1084. 1753, var. *asplenifolia*. TYPE: Plate 7, f. 16 of Petiver's "Pterigraphia Americana," which is a transposed redrawing of t. 102A of Plumier's "Traité..." which illustrates a plant collected by Plumier on Martinique. Proctor (Brit. Fern Gaz. 9:76. 1962) correctly excluded Linnaeus' variety β from the concept of this species; it is *G. cultrata*.

Polypodium laxifrons Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:204 (repr. 52). 1849. LECTOTYPE: Barranca de S. Francisco near Mirador, Edo. Veracruz, Mexico, Liebm. Pl. Mex. 2713, Fl. Mex. 2321 (C not seen; isoelectotype US), chosen by A. R. Smith (Fl. Chiapas 2:120. 1981).

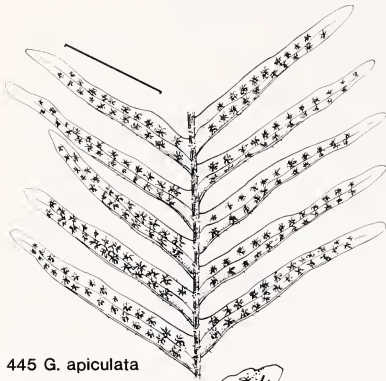
Polypodium repandum Fée, Crypt. Vasc. Brésil 1:87, t. 29, f. 1. 1869, non Lour., 1790, nom. illeg. SYNTYPES: Brazil, Glaziou 2409 (P or RB not seen); and Serra do Couto, Est. Rio de Janeiro, Brazil, Glaziou 3170 (P or RB not seen).

Polypodium laxifrons var. *lividum* Kuhn ex Krug in Urban, Bot. Jahrb. Syst. 24:126. 1897. LECTOTYPE: Mt. Guaraguao, Adjuntas, Puerto Rico, Sintenis 4328 (US), chosen by Lellinger (Proc. Biol. Soc. Wash. 89:727. 1977).

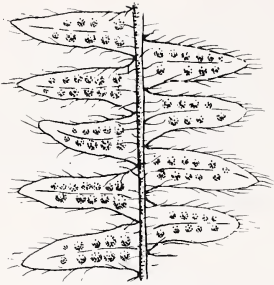
Plants epiphytic, at 1400–2100 m elevation, in forests, from La Palma de S. Ramón, the Cordillera Central, Cerro Carpintera, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from the Antilles, Mexico to Nicaragua, Trinidad, Venezuela, Colombia, Ecuador, and Bolivia.

447. *Grammitis atroviridis* (Copel.) F. Seym. Phytologia 31:176. 1975.

Ctenopteris atroviridis Copel. Philipp. J. Sci. 84:461. 1956. TYPE: Volcán Turrialba, Pcia. Cartago, 3000 m, Torres R. 195 (US).



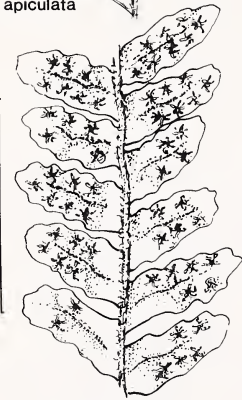
445 *G. apiculata*



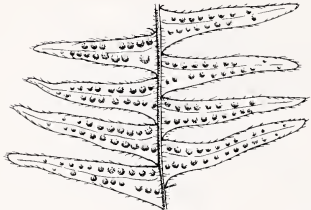
446 *G. asplenifolia*



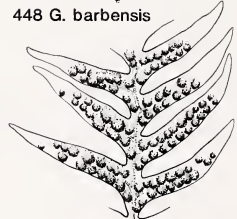
448 *G. barbensis*



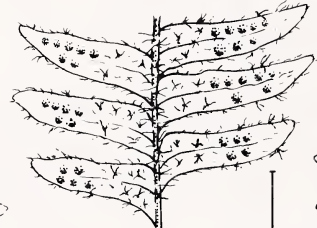
452 *G. epiphytica*



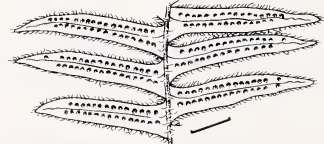
449 *G. chrysleri*



450 *G. cornuta*



451 *G. cultrata*



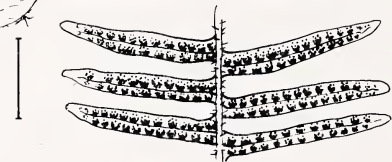
447 *G. atroviridis*



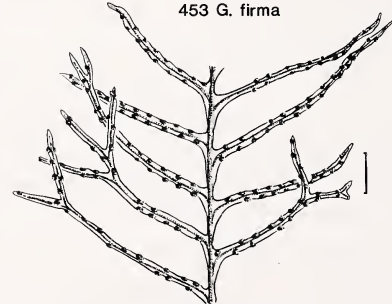
456 *G. jamesonioides*



455 *G. isidrensis*



453 *G. firma*



454 *G. fucoides*

Plants epiphytic, at (700)1000–2300 m elevation, in forests, from Monteverde, the Cordillera Central, Cerro Carpintera, Tapantí, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, Cerro Campana, and Cana.

448. *Grammitis barbensis* Lellinger, Proc. Biol. Soc. Wash. 98:379, f. 11. 1985.

TYPE: Volcán Barba, Pcia. Heredia, 3000 m, *Valerio 209* (US).

Plants epiphytic, at 3000 m elevation, in forests, known only from the type.

449. *Grammitis chryseri* (Copel.) Proctor, Brit. Fern Gaz. 9:218. 1965.

Ctenopteris chryseri Copel. Philipp. J. Sci. 84:448. 1956. TYPE: Morces Gap to Vinegar Hill, Jamaica, 3950–5000 ft, *Maxon 1524* (US).

Plants epiphytic, at 1300–1500(2300) m elevation, in forests, from Tapantí, Orosi, and Muñeco (all Pcia. Cartago), Cana, and Cerro Pirre. Also from Jamaica, Hispaniola, Venezuela, Colombia, and Bolivia.

450. *Grammitis cornuta* Lellinger, Proc. Biol. Soc. Wash. 98:381, f. 12. 1985.

TYPE: Las Nubes, Pcia. S. José, ca. 1500–1900 m, *Standley 38843* (US).

Plants epiphytic, at 1500–2300 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí.

The anastomosing venation doubtless correlates with the wide segments.

451. *Grammitis cultrata* (Willd.) Proctor, Rhodora 63:35. 1961.

Polypodium asplenifolium var. β L. Sp. Pl. 2:1085. 1753. TYPE: Plate 88 of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique. Linnaeus' citation of the Petiver reference is in error, and should be *Polypodium pendulum subtus pilosum*, t. 12, f. 3.

Polypodium cultratum Willd. Sp. Pl. ed. 4, 5:187. 1810. TYPE: Jamaica, *Swartz* (B-Hb. Willd. 19674 not seen Tryon photo).

Polypodium senile Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:60, t. 25, f. 1. 1857. TYPE: Ocaña, Depto. Norte de Santander, Colombia, *Schlim 364* (RB not seen).

Polypodium antioquianum Baker, J. Bot. Brit. For. 19:205. 1881. TYPE: Depto. Antioquia, Colombia, *Kalbreyer 1203* (K not seen photo and fragm US).

Plants epiphytic, at 0–2700 m elevation, in forests, from near S. Ramón, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, Cerro Tacarcuna, and the Chocó. Also from the Greater Antilles, Mexico to El Salvador, Venezuela, and Colombia to Bolivia.

452. *Grammitis epiphytica* (Copel.) Lellinger, Proc. Biol. Soc. Wash. 89:714. 1977.

Ctenopteris epiphytica Copel. Philipp. J. Sci. 84:436. 1956. TYPE: La Trojita, Río Calima, Depto. El Valle, Colombia, 5–50 m, *Cuatrecasas 16723* (US).

Plants epiphytic, at 0–100 m elevation, in forests, known only from the type.

FIGS. 445–456. *Grammitis*. FIG. 445. Median portion of lamina of *G. apiculata*, Skutch 4361. FIG. 446. Median portion of lamina of *G. asplenifolia*, Lellinger 650. FIG. 447. Median portion of lamina of *G. atroviridis*, Lellinger 755. FIG. 448. Median portion of lamina of *G. barbensis*, Valerio 209. FIG. 449. Median portion of lamina of *G. chryseri*, R. S. Williams 846. FIG. 450. Median portion of lamina of *G. cornuta*, Maxon 5509. FIG. 451. Median portion of lamina of *G. cultrata*, Lellinger 1019. FIG. 452. Median portion of lamina of *G. epiphytica*, Cuatrecasas 16723. FIG. 453. Median portion of lamina of *G. firma*, Hatch & Wilson 250, Guatemala. FIG. 454. Median portion of lamina of *G. fucoides*, Skutch 3379. FIG. 455. Median portion of lamina of *G. isidrensis*, Standley & Valerio 50474. FIG. 456. Median portion of lamina of *G. jamesonioides*, Mickel 3204.

453. Grammitis firma (J. Smith) Morton, Contr. U. S. Natl. Herb. 38:110. 1967.

Polypodium firmum Klotzsch, Linnaea 20:378. 1847, non Kaulf., 1827, nom. illeg. LECTOTYPE: Guyana, *Rich. Schomburgk 1170* (B not seen; isoelectotype K not seen), chosen by Looser (Rev. Univ. Chile 36(1):75. 1951).

Ctenopteris firma J. Smith, Hist. Fil. 184. 1875. TYPE: A renaming of *Polypodium firmum* Klotzsch, and so based on the type of that name.

Polypodium aromaticum Maxon, Proc. U. S. Natl. Mus. 27:743. 1904. TYPE: Blue Mountain Peak, Jamaica, 1950–2225 m, *Underwood 1449* (NY not seen fragm US).

Polypodium herzogii Rosenst. Repert. Spec. Nov. Regni Veg. 6:176. 1908. TYPE: Incacorral, Pcia. Cochabamba, Bolivia, 2200 m, *Herzog 783* (S not seen; isotypes UC, US).

Plants epiphytic, at 1000–2500 m elevation, in forests, from the Cordillera Central. Also from Jamaica, Mexico, Guatemala, Venezuela, Colombia, Peru, Bolivia, and Guyana.

454. Grammitis fucoides (Christ) Morton, Phytologia 22:78. 1971.

Polypodium fucoides Christ, Bull. Herb. Boissier II, 5:2. 1905. TYPE: Costa Rica, *Wercklé 172* (P not seen; isotype US).

Polypodium crassulum Maxon, Contr. U. S. Natl. Herb. 17:598. 1916. TYPE: Tablazo, Pcia. San José, 1900 m, *Brade* (US fragm NY; isotype UC).

Plants epiphytic, at (1000)1500–2700 m elevation, in forests, from the Cordillera Central and the north end of the Cordillera de Talamanca.

455. Grammitis isidrensis (Copel.) F. Seym. Phytologia 31:178. 1975.

Ctenopteris isidrensis Copel. Philipp. J. Sci. 84:441. 1956. TYPE: Yerba Buena, northeast of S. Isidro, Pcia. Heredia, ca. 2000 m, *Standley & Valerio 49881* (US).

Plants epiphytic, at (1000)2000–2500 m elevation, in forests, from La Palma de S. Ramón (Pcia. Alajuela) and the southern flanks of Volcán Barba.

456. Grammitis jamesonioides (Fée) Morton, Contr. U. S. Natl. Herb. 38:108. 1967.

Polypodium jamesonioides Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:59, t. 21, f. 4. 1857. TYPE: “Provincia Ocaña,” Depto. Norte de Santander, Colombia, *Schlim 399* (P or RB not seen).

?*Ctenopteris nudipes* Copel. Philipp. J. Sci. 84:405. 1956. TYPE: Volcán Chiriquí, Pcia. Chiriquí. 10400 ft, *Davidson 1022* (US; isotype MO? not seen).

Plants epiphytic, at 2700–3200 m elevation, in forests, from the Cordillera de Talamanca to Pcia. Chiriquí. Also from Hispaniola, Venezuela, and Colombia to Peru.

Ctenopteris nudipes is known only from the type, some fronds of which are more lobed than is typical for *G. jamesonioides*, but the specimen probably falls within the range of variation of that species.

457. Grammitis kalbreyeri (Baker in im Thurn) Morton, Amer. Fern J. 60:66. 1970.

Polypodium longipes Fée, Crypt. Vasc. Brésil 2:53, t. 95, f. 3. 1873, non Link, 1850, nom. illeg. TYPE: Serra dos Orgãos, Est. Rio de Janeiro, Brazil, *Glaziou 4414* (P or RB not seen).

Polypodium kalbreyeri Baker in im Thurn, Timehri 5:215. 1886. SYNTYPES: Mt. Roraima, Edo. Bolívar, Venezuela, *im Thurn 186* (K not seen); and “Prov. of Ocaña,” Depto. Norte de Santander, Colombia, 6500 ft, *Kalbreyer* (K not seen).

Polypodium transiens Lindm. Ark. Bot. 1:235, t. 11, f. 7. 1903. TYPE: A renaming of *P. longipes* Fée, and so based on the type of that name.

Polypodium roraimense Brause, Notizbl. Königl. Bot. Gart. Berlin 6:110. 1914, non Baker, 1887, nom. illeg. TYPE: Mt. Roraima, Edo. Bolívar, Venezuela, *Ule* 8520 (B not seen fragm US; isotypes K not seen Maxon photo, L not seen photo 1984, UC).

Polypodium pressum Brause, Repert. Spec. Nov. Regni Veg. 13:294. 1914. TYPE: A renaming of *P. roraimense* Brause, and so based on the type of that name.

Plants epiphytic, at 1000–2300 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Cerro Tablazo, the upper Río Reventazón and Orosi valleys and Platanillo (all Pcia. Cartago), and around Boquete. Also from Guatemala, Venezuela, Colombia, Peru, Guyana, Surinam, and Brazil.

This species is polymorphic. Virtually all specimens from Central America have elongate laminae and slightly ciliate rhizome scales; these match the illustration of *P. longipes* Fée. Most specimens from the Guyana Highlands have more deltate laminae and entire rhizome scales. The photograph of the isotype of *P. roraimense* at Kew shows that both forms can occur on the same plant.

458. *Grammitis lanigera* (Desv.) Morton, Contr. U. S. Natl. Herb. 38:105. 1967, var. *lanigera*.

Polypodium lanigerum Desv. Ges. Naturf. Freunde Berlin Mag. 5:316. 1811. TYPE: Peru, *Dombey* (P not seen Cintract photo).

Polypodium sericeo-lanatum Hook. Sp. Fil. 4:221. 1864. LECTOTYPE: Ravines of Pichincha, Pcia. Pichincha, Ecuador, 11000–12000 ft, *Jameson* 235 (K not seen fragm US), chosen by Morton (Contr. U. S. Natl. Herb. 38:105. 1967).

Polypodium alternifolium Hook. Sp. Fil. 4:222, t. 277A. 1864, non Willd., 1810, nom. illeg. LECTOTYPE: Near Esmeraldas and between Cuenca and Guayaquil, Ecuador, 3000–10000 ft, *Jameson* (K not seen Maxon photo fragm US), chosen by Morton (Contr. U. S. Natl. Herb. 38:105. 1967).

Polypodium longum C. Chr. Ind. Fil. 541. 1906. TYPE: A renaming of *Polypodium alternifolium* Hook., and so based on the type of that name.

Ctenopteris fabispora Copel. Philipp. J. Sci. 84:457. 1956, as “*fabaespora*.” TYPE: Between Alto de Las Palmas and the top of Cerro Horqueta, Pcia. Chiriquí, 2100–2268 m, *Maxon* 5479 (US).

Plants epiphytic, at 1200–2700(2900) m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí, and the Fila Costeña near S. Vito de Java. Also from Hispaniola, the Lesser Antilles, and Colombia to Bolivia.

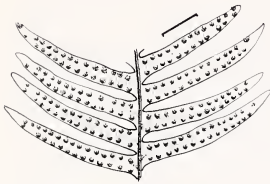
459. *Grammitis lehmanniana* (Hieron.) Morton, Contr. U. S. Natl. Herb. 38:104. 1967.

Polypodium lehmannianum Hieron. Bot. Jahrb. Syst. 34:513. 1904. LECTOTYPE: Near Cuaiquer and S. Pablo, Cordillera de Pasto, Depto. Nariño, Colombia, 1000–1300 m, *Lehmann* 19 (US), chosen inferentially by Maxon (Proc. Biol. Soc. Wash. 57:18. 1944).

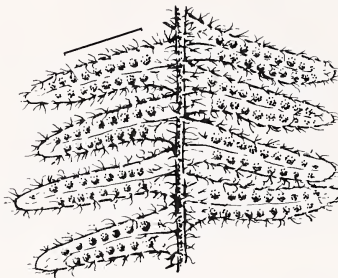
Polypodium pastoense C. Chr. Ind. Fil. 551. 1906, nom. superfl. TYPE: A renaming of *P. lehmannianum* Hieron., non *P. lehmannii* Mett., 1857, and so based on the type of *P. lehmannianum*.

Polypodium sublongipes Christ, Bull. Soc. Bot. Genève II, 1:218. 1909. TYPE: Costa Rica, *Wercklé* in 1904 (P not seen), synonymized by Maxon (Proc. Biol. Soc. Wash. 57:18. 1944).

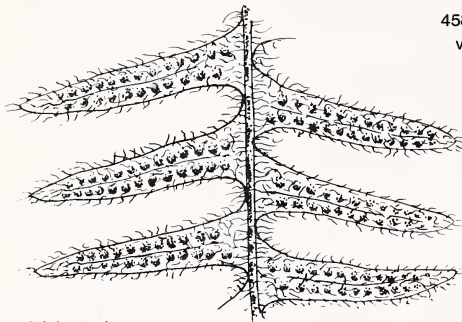
Plants epiphytic, at 200–1100 m elevation, in forests, from the road from S. Ramón to Los Angeles (Pcia. Alajuela), the Atlantic lowlands of northern Costa Rica, the Fortuna reservoir site (Pcia. Chiriquí), near Sta. Fé, and Cerro Campana (Pcia. Panama). Also from Guatemala and Ecuador.



457 *G. kalbreyeri*



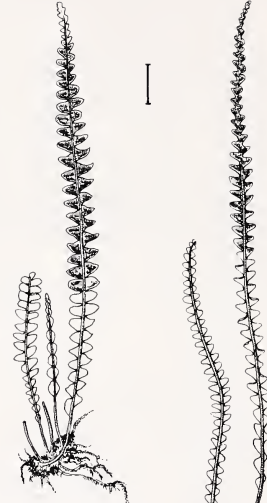
458 *G. lanigera*
var. *lanigera*



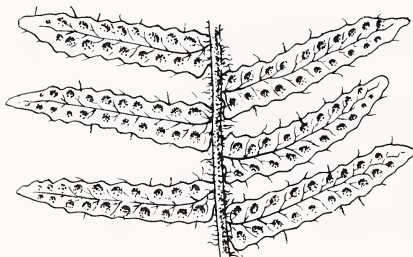
459 *lehmanniana*



464 *G. mollissima*



461 *G. melanosticta*



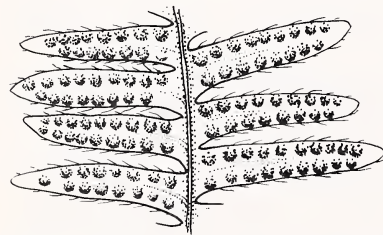
460 *G. mayoris*



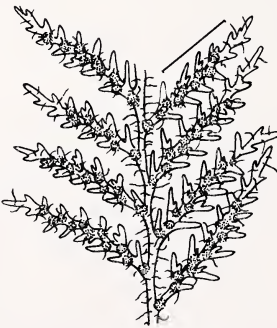
463 *G. micula*



465 *G. moniliformis*



462 *G. meridensis*



466 *G. myriophylla*

459a. *Grammitis mathewsii* (Kunze ex Mett.) Morton, Amer. Fern J. 60:66. 1970.

Polypodium mathewsii Kunze ex Mett. Abh. Senckenberg. Naturf. Ges. 2:74. 1856. SYNTYPES: Chachapoyas, Depto. Amazonas, Peru, *Mathews 1811* (B-Hb. Mett. not seen; isosyntype K? not seen), *1837* (BM not seen), and *3281* (K not seen).

Goniophlebium villeminianum Fée, Mém. Soc. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:63, t. 27, f. 3. 1857. TYPE: Ocaña, Depto. Norte de Santander, Colombia, 3400–3700 m, *Schlim 1009* (RB not seen; isotype BR not seen photo 5043).

Plants epiphytic or occasionally epipetric or terrestrial, in páramos, at 2000–2800 m elevation, in the Flora area known only from the Interamerican Highway 21–22 km southeast of El Empalme, Pcia. S. José (*Smith & Béliz 1993*, UC) and from Cerro Punta, Pcia. Chiriquí (*van der Werff & Herrera 6252*, UC). Also from Colombia to Bolivia.

460. *Grammitis mayoris* (Rosenst.) Lellinger, Amer. Fern J. 74:59. 1984.

Polypodium mayoris Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:53, t. 4, f. 6. 1912. TYPE: Páramo del Ruiz, Depto. Antioquia, Colombia, ca. 3700 m, *Mayor 69* (S not seen; isotype US).

Plants epiphytic, at 2000–3400 m elevation, in forests, from Volcán Turrialba and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Colombia.

461. *Grammitis melanosticta* (Kunze) F. Seym. Phytologia 31:179. 1975.

Polypodium melanostictum Kunze, Linnaea 9:44. 1834. TYPE: Cuesta de Carpis, Depto. Huánuco?, Peru, *Poeppig* in 1829 (LZ destroyed; isotype W not seen).

Polypodium calvum Maxon, J. Wash. Acad. Sci. 12:440. 1922. TYPE: Sierra Maestra, Pcia. Oriente, Cuba, *León 11131* (US).

Plants epiphytic, at 1200–1500 m elevation, in forests, in the Flora area known only from above Platanillo, ca. 22 km east of Turrialba, Pcia. Cartago, 1200–1450 m (*Mickel 3394*, NY, US). Also from Cuba, Hispaniola, Guatemala, Venezuela, Colombia, Peru, and Bolivia.

462. *Grammitis meridensis* (Klotzsch) F. Seym. Phytologia 31:179. 1975.

Polypodium meridense Klotzsch, Linnaea 20:380. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz 335* (B not seen).

Polypodium spixianum Mart. ex Mett. Abh. Senckenberg. Naturf. Ges. 2:57. 1856. TYPE LOCALITY: Brazil. “*P. nidulans* Beyr. herb.” is cited in synonymy.

Polypodium radicale Moritz ex Baker, Syn. Fil. 332. 1867. SYNTYPES: Southern Brazil, *Gardner 128* (B or K not seen); and Venezuela, *Fendler 216* (B or K not seen).

Polypodium meridense f. *undulatum* Hieron. Bot. Jahrb. Syst. 34:519. 1904, as “*undulata*.” TYPE: Mt. Bordoncillo near Pasto, Depto. Nariño, Colombia, 3000 m, *Lehmann 653* (B not seen).

Plants epiphytic, at 1500–3300 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Hispaniola, El Salvador, Venezuela, Colombia, Peru, Bolivia, and Brazil.

FIGS. 457–466. *Grammitis*. FIG. 457. Median portion of lamina of *G. kalbreyeri*, Lellinger 1063. FIG. 458. Median portion of lamina of *G. lanigera* var. *lanigera*, Maxon 8168. FIG. 459. Median portion of lamina of *G. lehmanniana*, Contreras 4781, Guatemala. FIG. 460. Median portion of lamina of *G. mayoris*, Evans & Lellinger 168. FIG. 461. Plant of *G. melanosticta*, Mickel 3394. FIG. 462. Median portion of lamina of *G. meridensis*, Evans & Lellinger 65. FIG. 463. Median portion of lamina of *G. micula*, Skutch 3015. FIG. 464. Median portion of lamina of *G. mollissima*, Pittier 4479. FIG. 465. Plant of *G. moniliformis*, L. O. Williams 20054. FIG. 466. Median portion of lamina of *G. myriophylla*, Gómez et al. 21892.

463. Grammitis micula Lellinger, *Proc. Biol. Soc. Wash.* 98:381, f. 13. 1985.

TYPE: Vicinity of S. Isidro del General, 1000 m, *Skutch 3015* (US; isotype UC).

Plants epiphytic, at 1000–1200(1800) m elevation, in forests, known only from the type and possibly from Alto del Buey (*Lellinger & de la Sota 261*, US).

This species was thought to be *Grammitis hombersleyi* (Maxon) Lellinger, a species from Trinidad differing in rhizome scales and segment shape.

464. Grammitis mollissima (Fée) Proctor, *Rhodora* 63:35. 1961.

Polypodium mollissimum Fée, *Hist. Foug. Antill.* [Mém. Foug. 11]:47, t. 12, f. 2. 1866. TYPE: Guadeloupe, *L'Herminier* in 1861 (P not seen frags NY and US).

Polypodium cultratum var. *elasticum* Jenm. *Bull. Bot. Dept. Jamaica N.S.*, 4:119. 1897. TYPE: Presumably Jamaica, *Jenman* (NY? not seen).

Plants epiphytic, at 100–2600 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca probably to Pcia. Chiriquí, Barro Colorado Island (Canal Zone), the upper Mamoni River (Pcia. Panama), and above Cana. Also from the Antilles, Mexico to Honduras, Colombia, and Venezuela to French Guiana.

465. Grammitis moniliformis (Lag. ex Swartz) Proctor, *Brit. Fern Gaz.* 9:219. 1965.

Polypodium moniliforme Lag. ex Swartz, *Syn. Fil.* 33. 1806. TYPE: Peru, *collector unknown* (S not seen photo 6020).

Polypodium subcrenatum Hook. *Icon. Plant.* 8:t. 719. 1845. TYPE: Andes of Quito, Pcia. Pichincha, Ecuador, *Jameson 215* (K not seen; isotype FI not seen photo 16012).

Polypodium moniliforme var. *major* Liebm. *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V*, 1:196 (repr. 44). 1849. LECTOTYPE: Pico de Orizaba, Edo. Veracruz, Mexico, *Liebmman Pl. Mex.* 2533 (C not seen), chosen by A. R. Smith (*Fl. Chiapas* 2:123. 1981).

Jamesonia adnata Kunze, *Farnkräuter* 2:80, t. 133, f. 1. 1851. TYPE: Páramo de Tolima, Depto. Tolima, Colombia, *Linden 1006* (LZ destroyed; isotypes B not seen Tryon photo, FI not seen photo 16010).

Polypodium angustissimum Fée, *Crypt. Vasc. Brésil* 2:55, t. 96, f. 3. 1873. TYPE: Brazil, *Glaziou 5297* (P or RB not seen).

Polypodium subdicarpon Fée, *Crypt. Vasc. Brésil* 2:55, t. 96, f. 4. 1873. TYPE: Brazil, *Glaziou 4410* (P or RB not seen).

Polypodium moniliforme var. *bogotense* Hieron. *Hedwigia* 48:249. 1909, as “*bogotensis*.” TYPE: Bogotá region, Depto. Cundinamarca, Colombia, *Stuebel 431 p. p.* (B not seen).

Polypodium moniliforme var. *minus* Christ, *Bull. Soc. Bot. Genève* II, 1:217. 1909. SYNTYPES: Crater of Volcán Irazú, 3380 m, *Pittier 179* (P not seen; isotype US); and Serra do Itatiaia, Est. Rio de Janeiro, Brazil, 2200 m, *Ule 3785* (P not seen).

Polypodium moniliforme var. *culebriliense* Bosco, *Nuovo Giorn. Bot. Ital. N.S.*, 45:149. 1938. TYPE: Páramo de Culebrilla, Pcia. Chimborazo?, Ecuador, 3500 m, *Crespi* (TO not seen).

Plants epiphytic or rarely terrestrial or on fallen logs, at (600)2000–3400(3600) m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and north of Cerro Torrá, west of the Río Surama, Depto. Chocó (*Forero 3159*, MO). Also from Jamaica, Hispaniola, Mexico to Honduras, Venezuela, Colombia to Bolivia, and Brazil.

466. Grammitis myriophylla (Mett. ex Baker) Morton, *Contr. U. S. Natl. Herb.* 38:108. 1867.

?*Polypodium longisetosum* Hook. *Sp. Fil.* 4:225. 1864. TYPE: Andes of Quito, Pcia. Pichincha, Ecuador, *Jameson 79* (K not seen).

Polypodium myriophyllum Mett. ex Baker, Syn. Fil. 338. 1868. TYPE: Tatanera, Depto. Puno, Peru, *Lechler* 2567 (K not seen; isotype L not seen fragm US).

Plants epiphytic, at 2500–3000 m elevation, in forests, in the Flora area known only from the upper Río Colubre, Pcia. Bocas del Toro (*Gómez et al.* 21892, 21935, both CR not seen, MO). Also from Ecuador, Peru, and Bolivia.

This species is most unusual in *Grammitis* in having pinnate-pinnatifid laminae.

467. *Grammitis nubigena* (Maxon) Proctor, Brit. Fern Gaz. 9:219. 1965.

Polypodium nubigenum Maxon, Contr. U. S. Natl. Herb. 17:599. 1916. TYPE: Blue Mountain Peak, St. Thomas Parish, Jamaica, 2200 m, *Maxon* 1477 (US).

Plants epiphytic, at 2500 m elevation, in the Flora area known only from Volcán Barba (*Valerio* 53, CR, US). Also from Jamaica.

467a. *Grammitis phlegmaria* (J. Smith) Proctor, Rhodora 68:467. 1966, var. *phlegmaria*.

Polypodium phlegmaria J. Smith, London J. Bot. 1:195. 1842. TYPE: Near Mt. Roraima, Edo. Bolívar, Venezuela, *Schomburgk* 161 (K not seen Maxon photo).

Polypodium tovarense Klotzsch, Linnaea 20:374. 1847. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Moritz* 251 (B not seen; isotype L not seen photo 1948).

Polypodium subdimidiatum Baker, Syn. Fil. 324. 1867. SYNTYPES: Venezuela, *Fendler* 207 (K not seen); Andes [Pcia. Pichincha?], Ecuador, *Jameson* 2122 (K not seen); and Guyana, *Appun* 1130 (K not seen).

Plants epiphytic, at 2500–2800 m elevation, in forests, in the Flora area known only from the Pan American Hwy. 21–22 km southeast of El Empalme, Pcia. S. José (*Smith & Béliz* 2080 and 2104, both UC). Also from Venezuela, Colombia, and Peru.

Proctor (*Rhodora* 68:467. 1966) distinguished Lesser Antillean material as var. *antillana*, which differs from continental material in having narrower and more oblong but less gibbous (almost entire) segments.

467b. *Grammitis pilipes* (Hook.) Morton, Phytologia 22:77. 1971.

Polypodium pilipes Hook. Icon. Pl. 3:t. 221. 1840. TYPE: Chachapoyas, Depto. Amazonas, Peru, *Mathews* in 1838 (K not seen photo 15425).

Polypodium blandum Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg [Mém. Foug. 7]:59, t. 22, f. 5. 1857. TYPE: South America, collector unknown (RB not seen).

Polypodium decipiens Hook. Sp. Fil. 4:231, t. 279B. 1862. TYPE: “Colombia” [Venezuela], *Moritz* 337 (K not seen; isotype US not seen), examined by Maxon (in herb.) and found to be the basis of Hooker’s illustration.

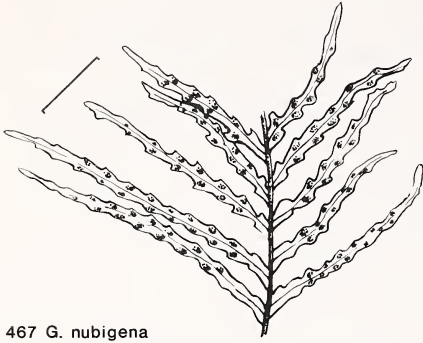
Polypodium pozuzoense Baker, Icon. Pl. 17:t. 1672. 1886–87. TYPE: Pozuzo, Pcia. Huánuco, Peru, 8000 ft, July 1863, *Pearce* (K not seen photo 15429).

Plants epiphytic, at 2800–2900 m elevation, in forests, in the Flora area known only from Volcán Barba (*Grayum & Quesada* 7420, MO). Also from Venezuela and Peru.

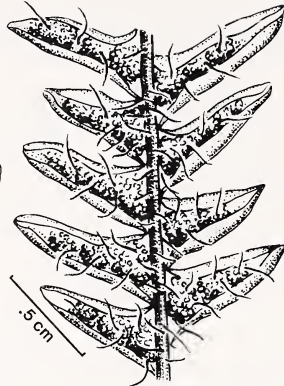
468. *Grammitis pilosissima* (Martens & Galeotti) Morton, Contr. U. S. Natl. Herb. 38:114. 1967.

Polypodium pilosissimum Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:39, t. 9, f. 2. 1842. LECTOTYPE: Zacuapan, Edo. Veracruz, Mexico, *Galeotti* 6379 (BR not seen photo 5017 fragm US; isoelectotype K not seen), chosen by A. R. Smith (Fl. Chiapas 2:124. 1981).

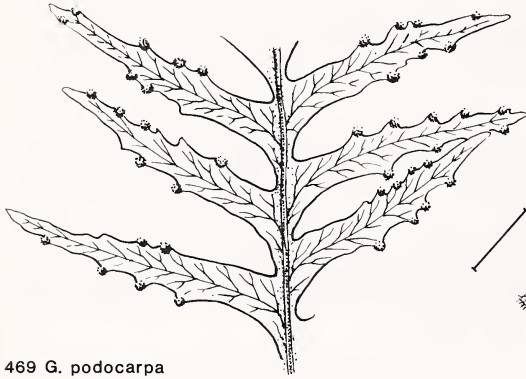
Polypodium pilosissimum var. *glabriusculum* Mett. Abh. Senckenberg. Naturf. Ges. 2:42. 1856, as “*glabriuscula*.” SYNTYPES: Mexico, *Leibold* 97 (B not seen); Mérida, Edo. Mérida, Venezuela,



467 *G. nubigena*



468 *G. pilosissima*



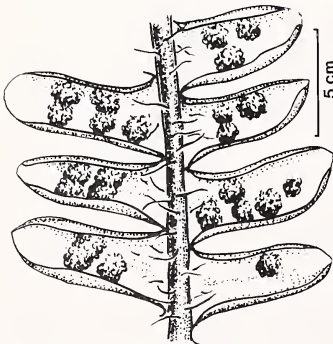
469 *G. podocarpa*



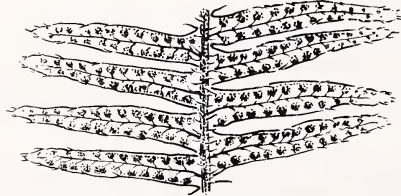
474 *G. staheliana*



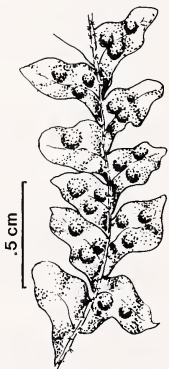
472 *G. sectifrons*



471 *G. rigescens*



473 *G. semihirsuta*



470 *G. randallii*

Moritz 216 (B not seen; isosyntype US); and Caracas, Distr. Fed., Venezuela, *Funck & Schlim 965* (B not seen).

Polypodium pilosissimum var. *hirsutum* Mett. Abh. Senckenberg. Naturf. Ges. 2:42. 1856, as "*hirsuta*." TYPE: Venezuela, *Funck & Schlim 1848* (B not seen).

?*Polypodium leptophyllum* Moritz ex Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:250 (repr. 332). 1864, non L., 1752, nom. illeg. SYNTYPES: Sosiego, Colombia, 2400–2600 m, *Lindig 300* (B not seen); Colonia Tovar, Edo. Aragua, Venezuela, *Moritz 437 p. p.* (B not seen; isosyntype L not seen photo 1830), *Fendler 217* (B not seen); Peru, *Lechler* (B not seen); Guyana, *Schomburgk* (B not seen). The Moritz specimen is *G. apiculata*, and does not agree with the original description.

Ctenopteris megaloura Copel. Philipp. J. Sci. 84:391. 1956. TYPE: Cobán, Depto. Alta Verapaz, Guatemala, 1350 m, *von Tuerckheim II 1855* (US).

Plants epiphytic or epipetric, at 2900–3500 m elevation, in forests and on trees in pastures, from Cerro de la Muerte (Pcia. Cartago), Cerro Chirripó, and Volcán Chiriquí. Also from Mexico and Guatemala.

This species is known only from high elevations. Rather similar specimens from lower elevations (1200–2500 m) are *G. xiphopteroides*.

469. *Grammitis podocarpa* (Maxon) F. Seym. *Phytologia* 31:180. 1975.

Polypodium podocarpum Maxon, Smithsonian Misc. Collect. 56(24):2, t. 1–3. 1911. TYPE: Upper Caldera watershed between Camp I and the Divide, Holcomb's trail above Boquete, Pcia. Chiriquí, 1650–1925 m, *Maxon 5640* (US; isotype NY).

Plants epiphytic, at 1600–2200 m elevation, in forests, from the Cordillera de Talamanca above Boquete.

469a. *Grammitis pruinosa* (Maxon) Morton, *Contr. U. S. Natl. Herb.* 38:262. 1973.

Polypodium pruinatum Baker, Syn. Fil. ed. 2. 508. 1874, non Swartz, 1802, nom. illeg. TYPE: Chontales, Depto. Chontales, Nicaragua, *Tate 44* (K not seen photo 15430 fragm US).

Polypodium pruinum Maxon, Proc. Biol. Soc. Wash. 52:117. 1939. TYPE: A renaming of *P. pruinatum* Baker, and so based on the type of that name.

Grammitis kirkbridei Mickel, Amer. Fern J. 74:117, f. 3C. 1984. TYPE: Tres Bocas on the Río Cuasi, Pcia. Darién, Panama, *Kirkbride & Duke 1381* (NY not seen; isotype MO).

Plants epiphytic, at ca. 100–1000 m, in forests, in the Flora area known only from Cerro Jefe and from Tres Bocas on the Río Cuasi (Pcia. Darién). Also from Nicaragua and Venezuela.

470. *Grammitis randallii* (Maxon) Proctor, *Brit. Fern Gaz.* 9:219. 1975.

Polypodium randallii Maxon, Amer. Fern J. 18:46. 1928. TYPE: Crest of Gossamer Peak, St. Thomas Parish, Jamaica, 800–900 m, *Maxon 9280* (US fragm NY; isotype IJ not seen).

Plants epiphytic, at 1000–1400 m elevation, in forests, from Cerro Jefe, Cerro Mali (Pcia. Darién), and east of the Alturas de Nique (Pcia. Darién). Also from Jamaica.

This species looks very much like a diminutive specimen of *G. barbensis*, but differs in its bifid to stellate stipe hairs.

FIGS. 467–474. *Grammitis*. FIG. 467. Median portion of lamina of *G. nubigena*, Valerio 53. FIG. 468. Median portion of lamina of *G. pilosissima*, Maxon 5341. FIG. 469. Median portion of lamina of *G. podocarpa*, Maxon 5460. FIG. 470. Median portion of lamina of *G. randallii*, Gentry & Mori 13811. FIG. 471. Median portion of lamina of *G. rigescens*, Pittier 10464. FIG. 472. Median portion of lamina of *G. sectifrons*, Skutch 3298. FIG. 473. Median portion of lamina of *G. semihirsuta*, Mickel 3200. FIG. 474. Median portion of lamina of *G. staheliana*, Lellinger 1319.

471. *Grammitis rigescens* (Bory ex Willd.) Lellinger, Proc. Biol. Soc. Wash. 89:383. 1985.

Polypodium rigescens Bory ex Willd. Sp. Pl. ed. 4, 5:183. 1810. TYPE: Réunion, *Bory* (probably P-Hb. Juss. 1098-C not seen photo 2951).

Polypodium rigescens var. *major* Hieron. Bot. Jahrb. Syst. 34:503. 1904. TYPE: Mt. Ruiz, Depto. Caldas or Tolima, Colombia, 3000 m, Apr 1882, *Schmidtchen* (B not seen).

Plants epiphytic, at 2100–3400 m elevation, from between Cerro Gallito and Volcán Barba (Pcia. Heredia), and Páramo Buena Vista, Villa Mills, and vicinity (Pcias. S. José and Cartago). Also from Hispaniola, Venezuela, Colombia to Peru, and Brazil.

472. *Grammitis sectifrons* (Kunze ex Mett.) F. Seym. Phytologia 31:180. 1975.

Polypodium sectifrons Kunze ex Mett. Abh. Senckenberg. Naturf. Ges. 2:99, t. 2, f. 3–4. 1856. LECTOTYPE: Puerto Rico, *Schwanecke* (GH), chosen by Proctor (Ferns Jamaica 585. 1985).

Drynaria elastica Fée, Hist. Foug. Antill. [Mém. Foug. 11]:72, t. 20, f. 2. 1866, non *Polypodium elasticum* Bory ex Willd., 1810. TYPE: Guadeloupe, *L'Herminier?* (RB not seen).

Polypodium petraefolium Jenm. Bull. Bot. Dept. Jamaica N.S., 4:139. 1897. TYPE: A renaming of *Drynaria elastica* Fée, and so based on the type of that name.

Plants epiphytic, at 1000–2500 m elevation, in forests, from the Cordillera Central, the Reventazón and Orosi valleys (Pcia. Cartago), and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Jamaica, Hispaniola, Puerto Rico, the Lesser Antilles, Venezuela, and Colombia.

473. *Grammitis semihirsuta* (Klotzsch) Morton, Contr. U. S. Natl. Herb. 38:113. 1967, var. *semihirsuta*.

Polypodium semihirsutum Klotzsch, Linnaea 20:379. 1847. TYPE: “Panatahuas Provinciae,” Peru, Ruiz 9 (B not seen fragm NY; isotype US).

Polypodium leucolepis Gilbert, Bull. Torrey Bot. Club 24:260. 1897. TYPE: Blue Mountains, Jamaica, *Moore* (GH not seen).

Polypodium pectinatum var. *hispidum* Christ, Prim. Fl. Costaric. 3(1):15. 1901, as “*hispidum*.” TYPE: El Páramo, Buena Vista massif, Pcia. Cartago, 3000 m, *Pittier 10474* (BR or P not seen; isotypes CR, US).

Plants epiphytic, at (1100)3000–3500 m elevation, in forests, from La Palma de S. Ramón, the Cordillera de Talamanca to Pcia. Chiriquí, and Alto del Buey. Also from Jamaica, Hispaniola, Mexico to El Salvador, Venezuela, and Colombia to Bolivia.

Specimens with the costae and laminae setose abaxially have been called *G. semihirsuta* var. *fuscetosa* (Hieron.) Lellinger. Although Hieronymus (Bot. Jahrb. Syst. 34:515. 1904) ascribed this variety to Guatemala, Colombia, and Peru, I have found only specimens from the highlands of Colombia to be referable to it.

474. *Grammitis staheliana* (Posth.) Lellinger, Proc. Biol. Soc. Wash. 89:716. 1977.

Polypodium stahelianum Posth. Recueil Trav. Bot. Néerl. 23:401. 1928. TYPE: Emmaketen, Surinam, 700 m, *Gonggrijp & Stahel 5765* (U not seen photo 23).

Plants epiphytic, at (100)600–1200 m elevation, in forests, from west of S. Ramón, Loma Prieta (Pcia. Los Santos), above Penonomé, near Cerro Jefe, and the upper Río Truando. Also from Nicaragua, Venezuela, Colombia, and Surinam.

475. *Grammitis subcapillaris* (Christ) F. Seym. Phytologia 31:180. 1975.

Polypodium subcapillare Christ, Bull. Herb. Boissier II, 5:1. 1905. TYPE: La Palma, Wercklé 17033 (P not seen fragm and photo US).

Plants epiphytic, at 500–2000 m elevation, in forests and on trees in open areas, from the Cordillera de Tilarán, the Cordillera Central, the vicinity of Pejivalle (Pcia. Cartago), La Mesa (Pcia. Coclé), the Canal Zone, Cerro Jefe, and Cerro Tacarcuna and the Alturas de Nique (Pcia. Darién).

476. *Grammitis subsessilis* (Baker) Morton, Contr. U. S. Natl. Herb. 38:107. 1967.

Polypodium pteropus Hook. Sp. Fil. 4:192, t. 275B. 1862, non Blume, 1828, nom. illeg. SYNTYPES: Andes of Quito, Pcia. Pichincha, Ecuador, *Jameson* 348 (K not seen), *Spruce* 5712 (K not seen); Mt. Abitagua, Pcia. Tungurahua?, Ecuador, *Spruce* (K not seen); Mt. Roraima, Edo. Bolívar, Venezuela, *Schomburgk* (K not seen); and “New Grenada,” *Hartweg* 1495 (K not seen).

Polypodium subsessile Baker, Syn. Fil. 329. 1867. TYPE: A renaming of *Polypodium pteropus* Hook., and so based on the type of that name.

Polypodium euchlorum Kunze ex Hieron. Bot. Jahrb. Syst. 34:509. 1904, non Sodiro, 1883, nom. superfl. et illeg. TYPE: Although ostensibly a validation of the nomen nudum *P. euchlorum* Kunze ex Klotzsch (Linnaea 20:375. 1847), the name must be based on *P. subsessile* Bak. in Hook. & Bak., which was cited in synonymy.

Polypodium chiricanum Maxon, Contr. U. S. Natl. Herb. 17:597. 1916. TYPE: Between Alto de las Palmas and Cerro de la Horqueta, Pcia. Chiriquí, 2100–2268 m, *Maxon* 5478 (US).

Polypodium pendulum var. *boliviense* Rosenst. Repert. Spec. Nov. Regni Veg. 25:60. 1928. SYNTYPES: S. Carlos, Mapiro region, Depto. La Paz, Bolivia, 850 m, *Buchtien* 210 (S not seen; isosyntype US); and Hacienda Simaco above the road to Tipuani, Depto. La Paz, Bolivia, 1400 m, *Buchtien* 5256 (S not seen; isosyntype US).

Ctenopteris obovata Copel. Philipp. J. Sci. 84:442. 1956. TYPE: A renaming of *P. pendulum* var. *boliviense* Rosenst., and so based on the type of that name.

Plants epiphytic, at 200–2400 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca around Boquete, west of Sta. Fé, La Mesa (Pcia. Coclé), Cerro Jefe, Cerro Pirre, the Serranía de Darién, the Cerro de Garagará (Pcia. Darién), and the northern half of the Chocó. Also from Venezuela and Colombia to Bolivia.

The specimens from Pcia. Darién have appreciably narrower and more distant segments than do those from the cordilleras farther north.

477. *Grammitis subtilis* (Kunze ex Klotzsch) Morton, Contr. U. S. Natl. Herb. 38:104. 1967.

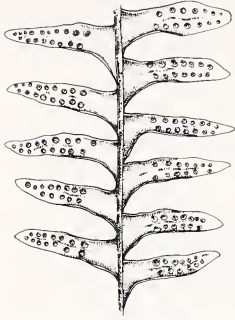
Polypodium subtile Kunze ex Klotzsch, Linnaea 20:375. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz* 325 (B not seen fragm NY; isotype US).

Plants epiphytic, at 1000–2400 m elevation, in forests, from the Cordillera Central, Cerro Carpintera, Tapantí, the vicinity of S. Isidro del General, and around Boquete. Also from Mexico, Guatemala, Venezuela, Colombia, and Ecuador.

478. *Grammitis suprasculpta* (Christ) F. Seym. Phytologia 31:181. 1975.

Polypodium suprasculptum Christ, Bull. Herb. Boissier II, 5:3. 1905. SYNTYPES: Volcán Turrialba, Pcia. Cartago, 2400 m, *Pittier* 14145 (P not seen); and Costa Rica, *Wercklé* (P not seen).

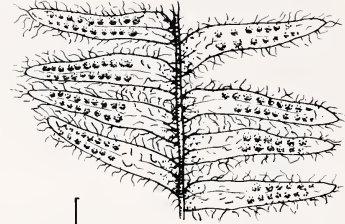
Plants epiphytic, at 1200–2400 m elevation, in forests, from La Palma de S. Ramón, the Cordillera Central, Alto de La Estrella (Pcia. Cartago), and Boquete.



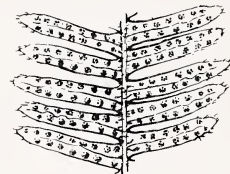
475 *G. subcapillaris*



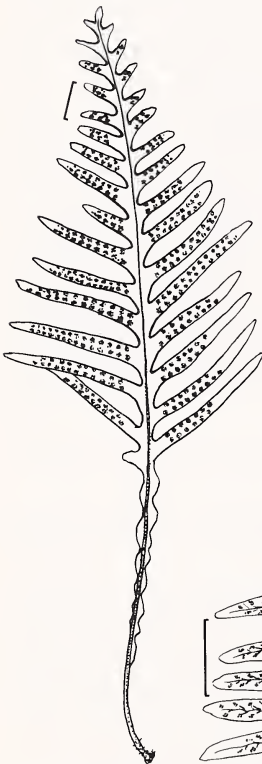
478 *G. suprasculpta*



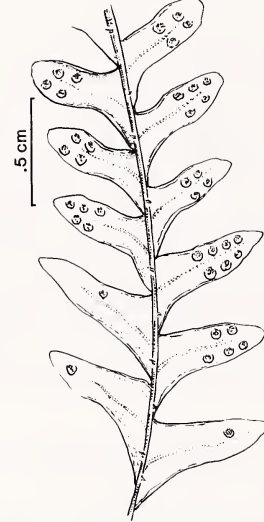
482 *G. turrialbae*



480 *G. taxifolia*



476 *G. subsessilis*



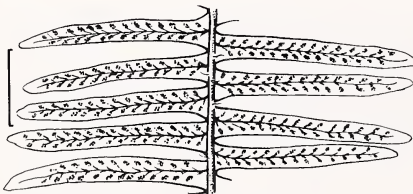
479 *G. suspensa*



481 *G. tmesipteris*



477 *G. subtilis*



483 *G. zeledoniana*



484 *G. jungermannioides*



485 *G. sprucei*

479. *Grammitis suspensa* (L.) Proctor, Brit. Fern Gaz. 9:77. 1962.

Polypodium suspensum L. Sp. Pl. 2:1084. 1753. TYPE: Plate 87, right hand figure, of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique.

Polypodium jubiforme Kaulf. Flora (Regensburg) 6:364. 1823, as "*iubaeforme*." TYPE: Martinique, Sieber Fl. Mart. 353 (PRC? not seen; isotypes FI not seen photo 15988, GH not seen).

Polypodium confusum J. Smith, London J. Bot. 1:194. 1842. TYPE: Guyana, Schomburgk 51 (K not seen fragm US).

Polypodium saccatum Fée, Gen. Fil. [Mém. Foug. 5]:239. 1852. SYNTYPES: Guadeloupe, Perrottet (P or RB not seen); and Martinique, Rivoire (P or RB not seen).

Polypodium jubiforme var. *delicatum* Christ in Urban, Bot. Jahrb. Syst. 24:126. 1897. TYPE: Guadeloupe, Mazé 1088 (P not seen).

Polypodium suspensum f. *minor* Kuhn ex Krug in Urban, Bot. Jahrb. Syst. 24:127. 1897. TYPE: Puerto Rico, Sitenis 420 (B not seen).

Ctenopteris rhizophorae Copel. Philipp. J. Sci. 84:425. 1956. TYPE: Along the Río Dagua, Buenaventura, Depto. El Valle, Colombia, Killip 5334 (US).

Plants epiphytic, at 200–1500 m elevation, in forests, from the lower Río S. Juan basin, and Alto del Buey. Also from the Antilles, Trinidad, Venezuela, Colombia, Guyana, and Surinam.

480. *Grammitis taxifolia* (L.) Proctor, Rhodora 63:35. 1961.

Polypodium taxifolium L. Sp. Pl. 2:1086. 1753. TYPE: Plate 89 of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique.

Polypodium l'herminieri Fée, Gen. Fil. [Mém. Foug. 5]:238. 1852. TYPE: Guadeloupe, Perrottet (P or RB not seen).

Polypodium l'herminieri var. *costaricense* Rosenst. Repert. Spec. Nov. Regni Veg. 22:17. 1925. TYPE: La Palma, 1400 m, Brade & Brade 216 (S not seen photo 6086; isotypes UC, US).

Plants epiphytic, at 1000–1800(3000) m elevation, in forests, from north of S. Ramón and the Cordillera Central. Also from Hispaniola, Puerto Rico, the Lesser Antilles, Trinidad, Venezuela, Ecuador, Surinam, and Brazil.

481. *Grammitis tmesipteris* (Copel.) F. Seym. Phytologia 31:181. 1975.

Ctenopteris tmesipteris Copel. Philipp. J. Sci. 84:410. 1956. TYPE: Cerro de Las Vueltas, Pcia. S. José, 3000 m, Standley 43755 (US).

Plants epiphytic, at 2700–3300 m elevation, in forests, from the Cordillera de Talamanca.

482. *Grammitis turrialbae* (Christ) F. Seym. Phytologia 31:181. 1975.

Polypodium turrialbae Christ in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35: Mém. 226. 1896. TYPE: Volcán Turrialba, Pcia. Cartago, 2750 m, Pittier 847 (BR not seen photo 5042; isotype US).

?*Polypodium crispulum* Christ, Bull. Herb. Boissier II, 4:1002. 1904. TYPE: Volcán Turrialba, Pcia. Cartago, 1400 m, Pittier 14147 (P not seen).

?*Polypodium exsudans* Christ, Bull. Herb. Boissier II, 4:1103. 1904. TYPE: Costa Rica, Wercklé in 1903 (P not seen).

FIGS. 475–485. *Grammitis*. FIG. 475. Median portion of lamina of *G. subcapillaris*, Standley & Valerio 47022. FIG. 476. Frond of *G. subsessilis*, Standley & Valerio 52254. FIG. 477. Median portion of lamina of *G. subtilis*, Killip 5289. FIG. 478. Median portion of lamina of *G. suprasculpta*, Mickel 3027. FIG. 479. Median portion of lamina of *G. suspensa*, Killip 35302. FIG. 480. Median portion of lamina of *G. taxifolia*, Skutch 3751. FIG. 481. Median portion of lamina of *G. tmesipteris*, Evans & Lellinger 171. FIG. 482. Median portion of lamina of *G. turrialbae*, Skutch 3421. FIG. 483. Median portion of lamina of *G. zeledoniana*, Maxon 8148. FIG. 484. Plant of *G. jungermannioides*, Maxon 8163. FIG. 485. Plant of *G. sprucei*, Skutch 2832.

Plants epiphytic, at 1500–2800 m elevation, in forests, from the Cordillera Central, and the Cordillera de Talamanca at Madre de Selva (Pcia. Cartago) and near the Panama border (Pcia. Limón).

482a. *Grammitis xiphopteroides* (Liebm.) A. R. Smith, Amer. Fern J. 70:26. 1980.

Polypodium xiphopteroides Liebm. K. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:196 (repr. 44). 1849. LECTOTYPE: Hacienda de Mirador, Edo. Veracruz, Mexico, *Liebmann Pl. Mex.* 2548 (C not seen), chosen by A. R. Smith (Fl. Chiapas 2:125. 1981).

Polypodium rigens Maxon, Proc. U. S. Natl. Mus. 27:741. 1904. TYPE: John Crow Peak, Jamaica, 1650–1800 m, *Maxon 1346* (US).

Ctenopteris vermicosa Copel. Philipp. J. Sci. 84:452, t. 9. 1956. TYPE: Alto de Estrella, Pcia. Cartago, *Standley 39140* (US), indicated as type by Copeland on the specimen, but not in the publication.

Plants epiphytic, at 1200–2500 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito de Java, and Cerro Jefe (Pcia. Panama). Also from Cuba, Jamaica, Hispaniola, Mexico, Guatemala, Honduras, Venezuela, Colombia to Peru, Surinam, and Brazil.

483. *Grammitis zeledoniana* Lellinger, Proc. Biol. Soc. Wash. 89:383. 1985.

Polypodium taxifolium var. *fragillimum* Christ, Bull. Herb. Boissier II, 4:1103. 1904, non *Grammitis fragillima* (Copel.) Morton, 1973. TYPE: Costa Rica, *Wercklé* in 1903 (P not seen).

TYPE: A renaming of *Polypodium taxifolium* var. *fragillimum* Christ, and so based on the type of that name.

Plants epiphytic, at (1000)1500–2500 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí.

GRAMMITIS sect. GRAMMITASTRUM (Fourn.) Morton

484. *Grammitis jungermannioides* (Klotzsch) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10:15. 1940.

Polypodium jungermannioides Klotzsch, Linnaea 20:373. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, *Moritz 312* (B not seen; isotype BM not seen).

Grammitis repanda Kunze ex Mett. Fil. Lechl. 1:9. 1856, nom. superfl. TYPE: A renaming of *P. jungermannioides* Klotzsch, and so based on the type of that name.

Polypodium sprucei var. *furcativenosa* Hieron. Bot. Jahrb. Syst. 34:499. 1904. SYNTYPES: Río Balsayacu near Pasto, Depto. Nariño, Colombia, *Lehmann 654* (B not seen; isosynotype US); and near Chilascó, Depto. Baja Verapaz, Guatemala, *Salvin & Godman* (K not seen).

Polypodium sprucei var. *costaricensis* Christ, Repert. Spec. Nov. Regni Veg. 8:17. 1910. TYPE: Volcán Barba, Pcia. Heredia, 2200 m, *Brade & Brade 296* (P? not seen; isotypes NY not seen, UC).

Plants epiphytic, at 600–2700 m elevation, in forests, from the Cordillera Central, Tapantí, the Cordillera de Talamanca to Pcia. Chiriquí, and S. Isidro del General. Also from Mexico to Honduras, Venezuela, and Colombia.

485. *Grammitis sprucei* (Hook.) J. Smith, Hist. Fil. 181. 1875.

Polypodium sprucei Hook. Sec. Cent. Ferns t. 10. 1860. TYPE: Near Tarapoto, Depto. S. Martín, Peru, *Spruce 4746* (K not seen; isotype US).

Polypodium dendricola Jenm. Gard. Chron. III, 16:467. 1894, as “*dendricolum*.” TYPE: Port Royal Mountains, Jamaica, *Hart* (IJ not seen; isotype NY not seen).

Polypodium rosulatum Christ in Bommer & Christ, Bull. Herb. Boissier 4:662. 1896. TYPE: Río Naranjo, Costa Rica, *Pittier 7953* (BR not seen photo 5027).

Polypodium yarumalense Hieron. Bot. Jahrb. Syst. 34:499. 1904. TYPE: Near Yarumal, Depto. Antioquia, Colombia, 2000–2200 m, *Lehmann 7390* (B not seen; isotype US).

Plants epiphytic, at 1200–2300 m elevation, in forests, from the Cordillera Central, Platanillo (Pcia. Cartago), and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Jamaica, Hispaniola, Colombia, and Peru.

GRAMMITIS sect. GRAMMITIS

486. *Grammitis bryophila* (Maxon) F. Seym. *Phytologia* 31:172. 1975.

Polypodium byrophilum Maxon, Amer. Fern J. 16:7. 1926. TYPE: Above La Palma on the road to La Hondura, Pcia. S. José, 1700 m, *Maxon & Harvey 7980* (US).

Polypodium haplophlebicum A. C. Smith, Bull. Torrey Bot. Club 58:37. 1931. TYPE: Mt. Duida, Terr. Fed. Amazonas, Venezuela, *Tate 553* (NY not seen; isotype US).

Plants epiphytic, at 1400–2700 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Villa Mills (Pcia. Cartago), and Cerro Jefe. Also from Venezuela, Colombia, and Bolivia.

487. *Grammitis bufonis* Gómez, *Phytologia* 52:154. 1982.

TYPE: Cerro Sapo, Pcia. Darién, 1085 m, *Hammel 1171* (MO).

Plants epiphytic, at 1000–1100 m elevation, in forests, from the Fortuna dam site (Pcia. Chiriquí), the hills north of El Valle, Cerro Jefe, and Cerro Sapo (Pcia. Darién).

488. *Grammitis leptopoda* (C. H. Wright) Copel. *Philipp. J.* 80:255. 1952.

Polypodium leptopodon C. H. Wright, Trans. Linn. Soc. London, Bot. II, 6:83. 1901. TYPE: Summit of Mt. Roraima, Edo. Bolívar, Venezuela, 8600 ft, *McConnell & Quelch 569* (K not seen photo US; isotypes NY, US).

Plants epiphytic, in the Flora area known only from Volcán Poás (*Stork 2337 p.*, UC). Also from Venezuela.

This species is very close to *G. bryophila*, but the differences in lamina shape and venation remain constant in specimens of all sizes, demonstrating that they are not correlated with lamina size and indicating that the two species appear to be distinct.

488a. *Grammitis limbata* Fée, Gen. Fil. [Mém. Foug. 5]:233. 1852.

Polypodium nigrolimbatum Jenm. Bull. Bot. Dept. Jamaica N.S., 4:69. 1897, nom. superfl. TYPE: A renaming of *Grammitis limbata* Fée, and so based on the type of that name.

Polypodium marginellum var. *brasiliense* Rosenst. Hedwigia 46:135. 1906. TYPE: Serra Ikerim, Est. Sta. Catarina, Brazil, *Schmalz 163* (S not seen; isotype UC).

Polypodium hessii Maxon, Bull. Torrey Bot. Club 42:223. 1915. TYPE: Sierra de Nagubo, Puerto Rico, *Hess 312* (US).

Plants epiphytic, at 800–900 m elevation, in forests, in the Flora area known only from Cerro Jefe (*Sytma 1469*, *Folsom et al. 7112*, both MO). Also from the Antilles, Bolivia, and Brazil.

489. *Grammitis marginella* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):17. 1801.

Polypodium marginellum Swartz, Nov. Gen. Sp. Pl. Prodr. 130. 1788. TYPE: Jamaica, *Swartz* (S not seen photo 6018; isotype UPS-Hb. Thunb. 24445 p. p. not seen).

Plants epiphytic, at (100)1400–2700 m elevation, in forests, from the Cordillera Central, Cerro Tablazo, the northern end of the Cordillera de Talamanca,



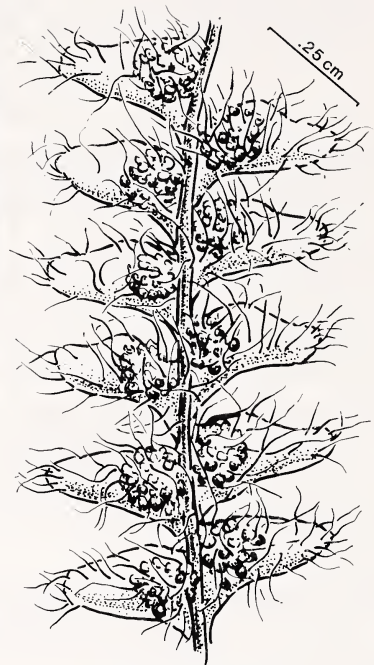
488 *G. leptopoda*



489 *G. marginella*



486 *G. bryophila*



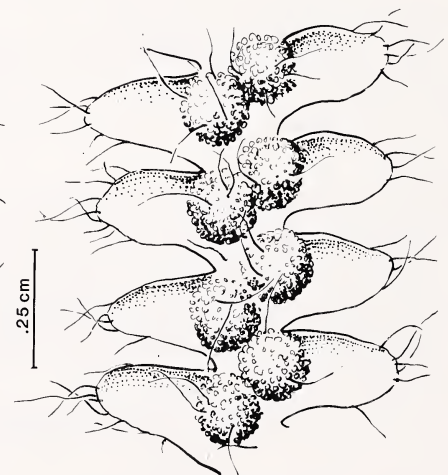
490 *G. blepharodes*



487 *G. fluminensis*



491 *G. caucana*



492 *G. cookii*

between Ft. S. Lorenzo and Ft. Sherman (Canal Zone), and Cerro Jefe. Also from Jamaica and Hispaniola.

489a. *Grammitis paramicola* L. E. Bishop, Amer. Fern J. 67:105. 1977.

TYPE: 25 km southeast of Gigante near the Huila–Caquetá divide, Depto. Huila, Colombia, 11000 ft, *Little 8663* (US).

Plants epiphytic, at 2400–2800 m elevation, in forests, in the Flora area known only from the Atlantic slope of the Cordillera Talamanca between the Río Terbi and the Río Siní, Pcia. Limón (*Davidse et al. 29020*, MO). Also from Colombia and Peru.

“GRAMMITIS sect. XIPHopteris (Kaulf.) Presl”

490. *Grammitis blepharodes* (Maxon) F. Seym. Phytologia 31:173. 1975.

Polypodium blepharodes Maxon, Contr. U. S. Natl. Herb. 17:407. 1914. TYPE: Near La Palma, Pcia. S. José, 1450–1550 m, *Maxon 406* (US; isotype NY).

Polypodium blepharodes var. *microlepis* Rosenst. Repert. Spec. Nov. Regni Veg. 22:14. 1925. TYPE: Cerro Tablazo, Pcia. S. José. 1900 m, *Brade & Brade 80b* (S not seen photo 5955a; isotypes NY, UC).

Plants epiphytic, at 500–1700 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, Cerro Carpintera, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito de Java, Cerro Tute (Pcia. Veraguas), El Valle and Penonomé, Cerro Azul (Pcia. Panama), Cerro Pirre, Cerro Mali, and Cerro de Garagará (all Pcia. Darién), and Alto del Buey. Also from Mexico, Guatemala, Nicaragua, Venezuela, and Colombia.

This species is closely related to, and may even be conspecific with, *G. blepharolepis* (C. Chr.) Morton, of which I have seen no authentic material. It is also similar to *G. daguensis*, which is a lowland species.

491. *Grammitis caucana* (Hieron.) Morton, Contr. U. S. Natl. Herb. 38:96. 1967.

Polypodium caucanum Hieron. Bot. Jahrb. Syst. 34:503. 1904. TYPE: Near the Río Dagua, Depto. Cauca, Colombia, 2300 m, *Lehmann 3257* (B not seen).

Plants epiphytic, at (600)1500–2100 m elevation, in forests, from north of S. Ramón, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and El Valle. Also from Nicaragua, Venezuela, Colombia, and Guyana.

492. *Grammitis cookii* (Underw. & Maxon) F. Seym. Phytologia 31:173. 1975.

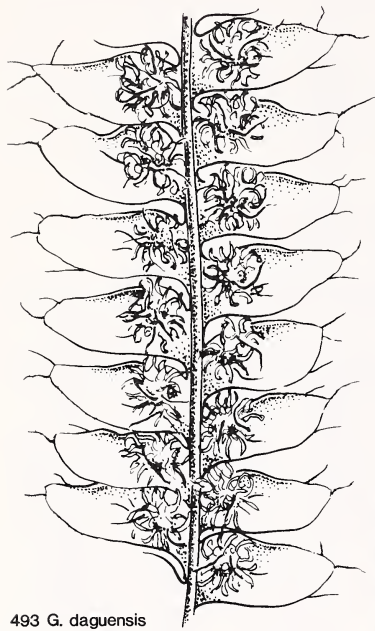
Polypodium cookii Underw. & Maxon, Contr. U. S. Natl. Herb. 17:408. 1914. TYPE: Near Finca Sepacuité, Depto. Alta Verapaz, Guatemala, *Cook & Griggs 80* (US fragm NY).

Plants epiphytic, at 1000–1700 m elevation, in forests, from Monteverde and the Cordillera Central. Also from Guatemala.

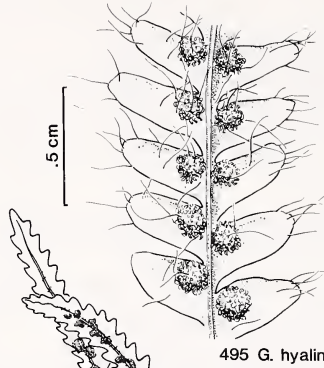
493. *Grammitis daguensis* (Hieron.) Morton, Contr. U. S. Natl. Herb. 38:98. 1967.

Polypodium daguense Hieron. Bot. Jahrb. Syst. 34:504. 1904. TYPE: Río Dagua, Depto. Cauca, Colombia, *Lehmann 1951* (B not seen fragm and photo US).

FIGS. 486–492. *Grammitis*. FIG. 486. Plant of *G. bryophila*, Maxon 7980. FIG. 487. Plant of *G. fluminensis*, Lellinger & de la Sota 778. FIG. 488. Plant of *G. leptopoda*, Wright, Guyana. FIG. 489. Plant of *G. marginella*, Standley & Valerio 48209. FIG. 490. Median portion of lamina of *G. blepharodes*, Standley 33123. FIG. 491. Median portion of lamina of *G. caucana*, Brade & Brade 80. FIG. 492. Median portion of lamina of *G. cookii*, Lellinger 773.



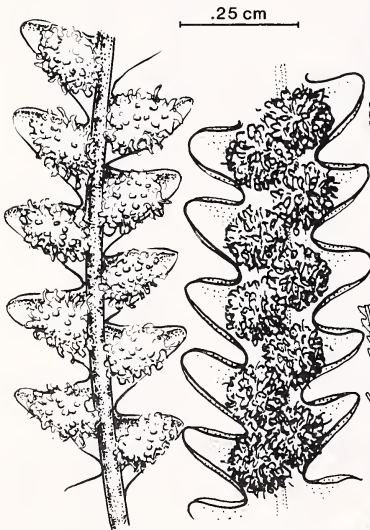
493 *G. daguensis*



495 *G. hyalina*



499 *G. pseudomitchellae*



496 *G. limula*



497 *G. mitchellae*



498 *G. myosuroides*



494 *G. delitescens*



500 *G. setulosa*

Plants epiphytic, at 0–300 m elevation, in forests, from the Río S. Juan basin and Boca Curiche (both Depto. Chocó). Also from Venezuela and Colombia to Bolivia.

This species is similar to *G. blepharodes*, which is an upland species, and to *G. blepharolepis* (C. Chr.) Morton, which has shorter, wider, and more distant segments. Some of the segments of *G. daguensis* are gibbous, and so that character does not separate the species from *G. blepharolepis* very well. Most of the Chocó specimens of *G. daguensis* are slightly intermediate between that species and *G. blepharolepis*; they have relatively shorter, less parallel-sided segments than do specimens of *G. daguensis* from Pcia. El Valle and Cauca.

494. *Grammitis delitescens* (Maxon) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:32. 1953.

Polypodium delitescens Maxon, Bull. Torrey Bot. Club 32:74. 1905. LECTOTYPE: Summit of Blue Mountain Peak, Jamaica, Maxon 1513 (US), chosen by Copeland (Amer. Fern J. 42:52. 1952).

Plants epiphytic, at ca. 900 m elevation, in forests, in the Flora area known only from one collection in Costa Rica (Gómez 776, CR) and from Cerro Jefe (Valdespino *et al.* 268, US). Also from Cuba, Jamaica, Mexico, Guatemala, Honduras, and Nicaragua.

This species is closely related to *G. myosuroides*.

494a. *Grammitis flabelliformis* (Poir.) Morton, Contr. U. S. Natl. Herb. 38:57. 1967.

Polypodium flabelliforme Poir. Encyc. Méth. 5:519. 1804. TYPE: Plate 87, left hand, of Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique.

Polypodium taenifolium Jenm. Bull. Bot. Dept. Jamaica N.S., 4:114. 1897. TYPE: At or near Mt. Moses, St. Andrew Parish, Jamaica, Syme (IJ not seen).

Polypodium sintenisii Hieron. Hedwigia 44:101. 1905. SYNTYPES: Mt. Hymene, Sierra de Luquillo, Puerto Rico, *Sintenis* 1796 (B not seen; isosyntype US); Mt. Guaraguo near Adjuntas, Puerto Rico, *Sintenis* 4327b (B not seen); Mt. Piedra in the Sierra de Naguabo, Puerto Rico, *Sintenis* 5462b (B not seen; isosyntype US); Guadeloupe (various localities), *Mazé* 18, 328, 673, 709 (all B none seen); and Grenada, *Sherring* 156 p.p. (B not seen).

Plants epiphytic, at 1000 m elevation, in forests, in the Flora area known only from Cerro Jefe (Valdespino *et al.* 329 and 354, both US). Also from Jamaica, Hispaniola, Puerto Rico, the Lesser Antilles, Trinidad, Venezuela, Colombia, and Surinam.

495. *Grammitis hyalina* (Maxon) F. Seym. Phytologia 31:174. 1975.

Polypodium hyalinum Maxon, Contr. U. S. Natl. Herb. 17:406. 1914. TYPE: Upper slopes of Volcán Barba, Pcia. Heredia, *Pittier* 1928 (US fragm NY).

Plants epiphytic, at 1800–2500 m elevation, in forests, from the Cordillera Central.

FIGS. 493–500. *Grammitis*. FIG. 493. Median portion of lamina of *G. daguensis*, Cuatrecasas, Colombia. FIG. 494. Plant of *G. delitescens*, Williams & Molina 13690, Honduras. FIG. 495. Median portion of lamina of *G. hyalina*, Valerio A66. FIG. 496. Median portion of lamina of *G. limula*, Lellinger 1091. FIG. 497. Median portion of lamina of *G. mitchellae*, Maxon 3213, Guatemala. FIG. 498. Plant of *G. myosuroides*, Proctor 4363, Jamaica. FIG. 499. Median portion of lamina of *G. pseudomitchellae*, Killip 5289a. FIG. 500. Median portion of lamina of *G. setulosa*, Evans & Lellinger 66.

496. *Grammitis limula* (Christ) Gómez, Brenesia 8:47. 1976.

Polypodium limulum Christ, Bull. Soc. Bot. Genève II, 1:218. 1909. SYNTYPES: La Palma, Pcia. S. José, 1500 m, Pittier 708 (P not seen), 1459 m, Tonduz 12595 (P not seen; isosyntype US), Brade 79 (P not seen), and Wercklé in 1903 (P not seen).

Plants epiphytic, at (500)700–2400 m elevation, in forests and on trees in pastures and along roadsides, from the Cordillera de Tilarán, the Cordillera Central, Cerro Tablazo, the Fila de Cedral, Cerro Carpintera, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Guatemala, Honduras, Venezuela, and Colombia.

497. *Grammitis mitchellae* (Baker in Hemsl.) F. Szym. Phytologia 31:174. 1975.

Polypodium mitchellae Baker in Hemsl. Biol. Centr.-Amer., Bot. 3:664. 1885. TYPE: Orange Walk, Belize, Mitchell (K not seen).

Plants epiphytic, at ca. 500–800 m elevation, in forests, in the Flora area known only from along Sta. Rita ridge, Pcia. Colón (*Correa & Dressler 1043*, US). Also from Guatemala, Belize, and Nicaragua.

498. *Grammitis myosuroides* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):18. 1801.

Polypodium myosuroides Swartz, Nov. Gen. Sp. Pl. Prodr. 131. 1788. TYPE: Jamaica, Swartz (S not seen photo 6024).

Polypodium jamesonii Jenm. Bull. Bot. Dept. Jamaica N.S., 4:112. 1897, non Mett., 1883, nom. illeg. TYPE: Jamaica, Jenman (NY? not seen).

Plants epiphytic, at 2600–3000 m elevation, in forests, from the Cordillera de Talamanca to Villa Mills (Pcia. Cartago). Also from Cuba, Jamaica, Puerto Rico, and Mexico.

499. *Grammitis pseudomitchellae* Lellinger, Proc. Biol. Soc. Wash. 89:383, f. 14. 1985.

TYPE: 10 km north of S. Rafael de Heredia on Volcán Barba, Pcia. Heredia, 1950 m, Mickel 3033 (NY).

Plants epiphytic, at 1800–2000 m elevation, from Volcán Barba, Tapantí, and Holcomb's trail above Boquete.

In frond outline this species closely resembles *G. mitchellae* from Guatemala, but that species has forked veins in the segments, setose sporangia, fewer and shorter marginal setae, and more and shorter setae on the abaxial surface of the laminae.

500. *Grammitis setulosa* (Rosenst.) F. Szym. Phytologia 31:175. 1975.

Polypodium setulosum Rosenst. Repert. Spec. Nov. Regni Veg. 10:277. 1912. TYPE: S. Isidro del General, Pcia. S. José, 656 m, Tonduz (Hb. Jiménez 214) (S not seen; isotype fragm US).

Plants epiphytic, at (600)1500–2800 m elevation, in forests, from the Cordillera Central, Tapantí, the Cordillera de Talamanca to Cerro Chirripó, S. Isidro del General, the Peninsula de Osa, the Fila Costeña near S. Vito de Java, and Cerro Jefe. Also from Mexico, Guatemala, Nicaragua, and Colombia.

501. *Grammitis truncicola* (Klotzsch) Morton, Contr. U. S. Natl. Herb. 38:98. 1967.

Polypodium truncicola Klotzsch, Linnaea 20:374. 1847. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, Moritz 252 (B not seen; isotype US).

Polypodium truncicola var. *major* Klotzsch, Linnaea 20:374. 1847, nom. superfl. TYPE: The typical variety as described by Klotzsch, and so based on the type of *P. truncicola*.

Polypodium truncicola var. *minor* Klotzsch, Linnaea 20:374. 1847. TYPE: Mérida, Edo. Mérida, Venezuela, Moritz 333 (B not seen; isotypes NY, US).

Polypodium andinum Hook. Sec. Cent. Ferns t. 6. 1860. LECTOTYPE: Río Hondacha, Andes of Quito, Pcia. Pichincha, Ecuador, Jameson 780 (K not seen), chosen by Morton (Contr. U. S. Natl. Herb. 38:98. 1967).

Plants epiphytic, at 1200–1600 m elevation, in forests, from Monteverde, and La Palma and La Hondura (Pcia. S. José). Also from Venezuela to Peru.

502. *Grammitis zurquina* (Copel.) F. Seym. *Phytologia* 31:175. 1975.

Xiphopteris zurquina Copel. Amer. Fern J. 42:99, t. 9. 1952. TYPE: Cerros de Zurquí, northeast of S. Isidro, Pcia. Heredia, 2000–2400 m, Standley & Valerio 50495 (US).

Plants epiphytic, at (1200)1900–2400(3300) m elevation, in forests, from S. Ramón, the southeastern slopes of Volcán Barba, and Cerro Asunción (Pcia. Cartago).

58. GLYPHOTAENIUM J. Smith

Plants epiphytic; rhizomes short-creeping, scaly, the scales linear-lanceate, not clathrate, often setose or glandular at least on the margin; stipes usually about equalling the laminae, sometimes somewhat shorter, scaly only at the base, long-setose, the setae thin, flexible, reddish-brown; fronds small to medium-sized, monomorphic; laminae simple, entire to lobed, mostly oblong, thick and spongy, setose on the margins and sparsely so on the lamina surface, the setae long, reddish-brown; veins usually at least partially anastomosing with 1 row of long, narrow areolae on each side of the midrib; sori lateral on the veins, elliptical to linear, rarely round, often in several series, usually immersed in cavities in the lamina, exindusiate; paraphyses obscure; sporangia long-stalked.

Neotropical; 9 species.

1. Sori mostly linear, 2–5 mm long, deeply immersed in the lamina tissue. Rhizome scales entire, eglandular or with a few gland-tipped hairs along the margins; stipes 3–14 cm long, brown or gray; laminae lanceate, 5–15 cm long, 2–4 cm wide, obtuse at the base, acute at the apex, lobed 1/3–2/3 of the way to the midrib, the lobes 1–2 times longer than wide.

505. *G. spongiosum*

1. Sori mostly round or elliptical to elongate, up to 2(3) mm long, superficial to deeply immersed...2.

2(1). Rhizome scales densely glandular, the glands whitish, cylindrical; laminae undulate to entire, rarely lobed. Stipes 1.5–5 cm long; laminae linear, 2–11.5 cm long, 5–11(14) mm wide, round at the apex, acute at the base.

504. *G. percrassum*

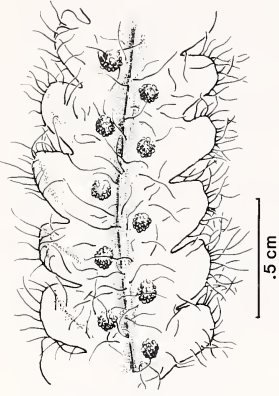
2(1). Rhizome scales eglandular, entire or distantly ciliate-toothed; laminae lobed to undulate, rarely entire...3.

3(2). Rhizome scales distantly ciliate-toothed, contorted near the apex, gray to yellowish; stipes atropurpureous, smooth; sori often more than 1 mm wide. Stipes 2–11 cm long; laminae linear or linear-lanceate, (6)8–20(25) cm long, (1.5)2–4 cm wide, acute to obtuse at the base, all but the juveniles crenately or serrately lobed.

506. *G. trifurcatum*

3(2). Rhizome scales entire, not contorted near the apex, yellowish to orange; stipes brown or gray, minutely fluted; sori usually less than 1 mm wide. Stipes 3–5 cm long; laminae linear, (3)5–15(38) cm long, (0.6)1–1.5 cm wide, acute to obtuse at the apex, all but the juveniles crenately lobed.

503. *G. crispatum*



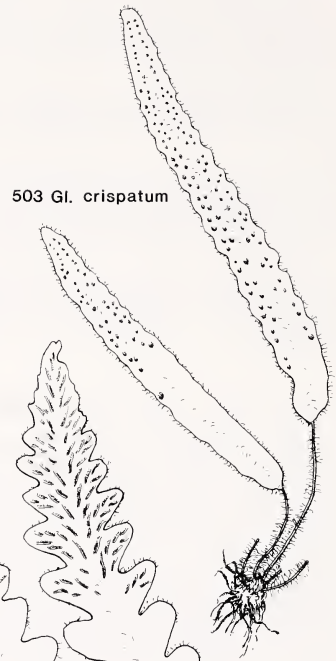
501 *G. truncicola*



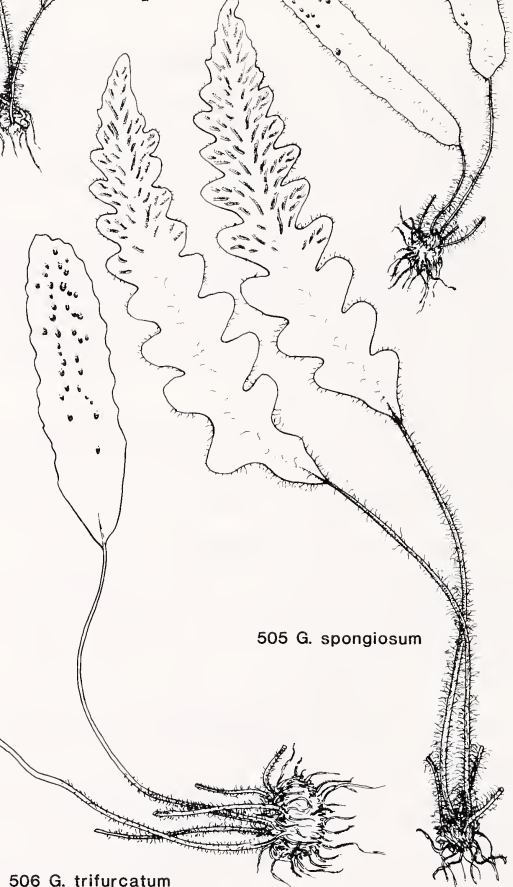
502 *G. zurquina*



504 *G. percrassum*



503 *Gl. crispatum*



506 *G. trifurcatum*

505 *G. spongiosum*

503. *Glyphotaenium crispatum* (J. Smith in Seem.) J. Smith, Hist. Fil. 188. 1875.

Ctenopteris crispata J. Smith in Seem. Bot. Voy. Herald 227, t. 48. 1854, non *Polypodium crispatum* L., 1753. SYNTYPES: Isla de Cacahual, Depto. Chocó, *Seemann* (BM not seen); and Bay of Chocó, Colombia, *Seemann* 995 (BM not seen fragm US).

Polypodium goniopteroides C. Chr. Ind. Fil. 530. 1906. TYPE: A renaming of *Ctenopteris crispata* J. Smith in Seem., and so based on the type of that name.

Polypodium enterosoroides Christ, Bull. Herb. Boissier II, 7:260. 1907. TYPE: La Palma, Pcia. S. José, 1500 m, *Wercklé* 17095 [or 17045?] (P not seen; isotypes NY, US).

Plants epiphytic, at 0–600 m elevation, in forests, from La Palma, Pejivalle (Pcia. Cartago), and the Bay of Chocó and Isla de Cacahual (Depto. Chocó). Also from Colombia and Ecuador.

Apparently this species grows only in the wettest forests.

504. *Glyphotaenium percrassum* (Baker) Copel. Gen. Fil. 212. 1947.

Polypodium percrassum Baker, J. Bot. Brit. For. 25:26. 1887. TYPE: Costa Rica, *Cooper* (K not seen fragm NY; isotype US).

Polypodium reptetum Christ, Bull. Herb. Boissier II, 7:260. 1907. TYPE: Costa Rica, *Wercklé* in 1905 (P not seen).

Plants epiphytic, at 1300–2600 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí.

505. *Glyphotaenium spongiosum* (Maxon) Copel. Gen. Fil. 212. 1947.

Enterosora spongiosa Maxon, Proc. Biol. Soc. Wash. 52:113. 1939. TYPE: Vicinity of La Palma, on the road to La Hondura, Pcia. S. José, ca. 1600 m, *Maxon & Harvey* 7975 (US).

Plants epiphytic, at 1500–2400 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí.

506. *Glyphotaenium trifurcatum* (L.) Lellinger, Amer. Fern J. 75:31. 1985.

Polypodium trifurcatum L. Sp. Pl. 2:1084. 1753. TYPE: Plate 138 in Plumier's "Traité...", which illustrates a specimen collected by Plumier on Martinique.

Polypodium trifurcatum var. *brevipes* Hieron. Bot. Jahrb. Syst. 34:500. 1904. SYNTYPES: Quebrada de Imbi, Río Cuaiquer, Cordillera de Pasto, Depto. Nariño, Colombia, *Lehmann* 77 (B not seen); Farallones de Cali, Depto. El Valle, Colombia, *Lehmann* 1977 (B not seen); and Cordillera west of Cali, Depto. El Valle, Colombia, *Lehmann* 7664 (B not seen; isosyntype US).

Plants epiphytic, at 700–2500 m elevation, in forests, from north of S. Ramón, the Cordillera Central, Pejivalle (Pcia. Cartago), the mountains of western Panama, Campo Tres northeast of Altos de Pacora (Pcia. Panama), Cerro de Garagará, Cana, and Cerro Pirre (all Pcia. Darién), and the Serranía del Darién and the Ciudad Bolívar–Quibdó road at ca. Km. 141 (Depto. Chocó). Also from the Antilles, Venezuela, Colombia to Bolivia, Guyana, and Surinam.

FIGS. 501–506. *Grammitis* and *Glyphotaenium*. FIG. 501. Median portion of lamina of *Gr. truncicola*, Maxon 392. FIG. 502. Median portion of lamina of *Gr. zurquina*, Standley & Valerio 51599. FIG. 503. Plant of *Gl. crispatum*, Skutch 2760. FIG. 504. Plant of *Gl. percrassum*, Standley & Torres 47929. FIG. 505. Plant of *Gl. spongiosum*, Skutch 4958. FIG. 506. Plant of *Gl. trifurcatum*, Standley & Valerio 51633.

59. COCHLIDIUM Kaulf.

Plants epiphytic or epipetric; rhizomes erect or ascending, scaly, the scales lanceate, concolorous; stipes short to obsolete, not articulate, brown, glabrous; fronds small to minute, monomorphic or subdimorphic; laminae simple, linear, entire (or the sterile portions serrately lobed in *C. serrulatum*), subcoriaceous, glabrous (or bearing short, cylindrical hairs in *C. serrulatum*), often bearing obvious hydathodes near the apex on the adaxial surface; veins free (unbranched or 1-forked) or sometimes casually anastomosing to form a partial series of areolae along the midrib; sori lateral on the veins, usually elongate and often confluent into a linear coenosorus, usually in a single, deep groove, exindusiate; paraphyses lacking; sporangia long-stalked.

Neotropical with 1 species extending to Africa; 16 species.

BISHOP, L. E. 1978. Revision of the genus *Cochlidium* (Grammitidaceae). *Amer. Fern J.* 68:76–94.

CHRISTENSEN, C. 1929. Taxonomic fern-studies I. Revision of the polypodioid genera with longitudinal coenosori... *Dansk Bot. Ark.* 6(3):1–93, t. I–XIII.

1. Sori superficial, round or broadly elliptical, often confluent at maturity, confined to a usually broad, entire terminal portion of the narrow, otherwise usually serrately lobed laminae; receptacles discrete, easily visible when the sporangia are removed. Rhizomes erect or ascending; laminae linear, 2–8 cm long, 0.5–2.5 mm wide.

509. *C. serrulatum*

1. Sori immersed in a long, deep groove, aggregated into a linear coenosorus along the uniformly wide, entire laminae; receptacles linearly confluent, closely parallel to the costa. 2.

2(1). Hydathodes obscure on the adaxial surface of the laminae, usually not visible under 20× magnification; sporangia more than 0.25 mm long. Rhizomes erect or ascending; laminae linear, 3–15 cm long, 1.5–2.5 mm wide.

508. *C. rostratum*

2(1). Hydathodes usually conspicuous on the adaxial surface of the laminae; sporangia less than 0.25 mm long. Rhizomes erect or ascending; laminae linear, (2.5)4–11 cm long, (1)2–4 mm wide.

507. *C. linearifolium***507. *Cochlidium linearifolium* (Desv.) Maxon ex C. Chr. *Dansk Bot. Ark.* 6(3):23. 1929.**

Monogramma linearifolia Desv. *Ges. Naturf. Freunde Berlin Mag.* 5:302, t. 7, f. 5. 1811. TYPE: French Guiana, collector unknown (P-Hb. Desv. not seen).

Pleurogramme immersa Fée, *Hist. Vittar. Pleurogr.* [Mém. Foug. 3]:37, t. 4, f. 5. 1852, nom. superfl. TYPE: A renaming of *Pleurogramma linearifolia* Desv., and so based on the type of that name.

Pleurogramme gyroflexa Christ in Pitt. *Prim. Fl. Costaric.* 3(1):10. 1901. TYPE: Valley of the Río General, Pcia. S. José, 700 m, *Pittier 12061* (BR or P not seen; isotype CR).

Plants epiphytic, at 0–600 m elevation, in forests, from the Atlantic coastal plain of Costa Rica, the valley of the Río General, the Peninsula de Osa, Cerro Jefe, Sta. Rita ridge (Pcia. Colón), above Cana, and the Corcovada region and Bahía Solano (Depto. Chocó). Also from Guatemala to Nicaragua, Colombia, Guyana, and Brazil.

508. *Cochlidium rostratum* (Hook.) Maxon ex C. Chr. *Dansk Bot. Ark.* 6(3):23. 1929.

Monogramme rostrata Hook. *Sp. Fil.* 5:122, t. 288B. 1864. TYPE: Island in Lake Omotepec, Depto. Rivas, Nicaragua, *Wright* (K not seen fragm NY; isotype US).

Cochlidium rostratum var. *areolatum* C. Chr. Dansk Bot. Ark. 6(3):25. 1929. TYPE: Morne Colombeau, Anse-à-Foleur, Haïti, *Ekman H-4376* (C not seen; isotype US).

Plants epiphytic, at 1500–2600(3000) m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Cuba, Jamaica, Hispaniola, the Lesser Antilles, Mexico to Nicaragua, Venezuela, and Colombia.

509. *Cochlidium serrulatum* (Swartz) L. E. Bishop, Amer. Fern J. 68:80. 1978.

Acrostichum serrulatum Swartz, Nov. Gen. Sp. Pl. Prodr. 128. 1788, non *Polypodium serrulatum* Mett., 1856. TYPE: Jamaica, *Swartz* (S not seen fragm US; isotypes B-Hb. Willd. 19589-1, 3 not seen Tryon photos).

Xiphopteris extensa Fée, Hist. Foug. Antill. [Mém. Foug. 11]:14, t. 19, f. 3. 1866. TYPE: Guadeloupe, *L'Herminier* in 1864 (P or RB not seen).

Polypodium duale Maxon, Contr. U. S. Natl. Herb. 16:61. 1912. TYPE: A renaming of *Acrostichum serrulatum* Swartz, and so based on the type of that name.

Xiphopteris auyantepuiensis Vareschi, Fl. Venez. 1(2):879. 1969. TYPE: Auyán-tepuí, Edo. Bolívar, Venezuela, 1800 m, *Vareschi & Foldats 4806* (VEN not seen).

Plants epiphytic, at (0)300–2500 m elevation, in forests and open areas, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, near Sta. Fé, Cerro Jefe, the Cerro de Garagará (Pcia. Darién), and Alto del Buey and the lower Río S. Juan. Also throughout tropical America.

60. LOXOGRAMME (Blume) Presl

Plants epipetric or epiphytic; rhizomes creeping, they and the roots bearing abundant, matted hairs, scaly, the scales lanceate, distinctly clathrate; stipes obsolete, subarticulate, scaly at the base, the scales like those of the rhizomes; fronds small, monomorphic; laminae simple, linear-elliptic, entire, attenuate at the base and apex, chartaceous, yellow-green, sparsely pilosulous, the hairs short, relatively thick, cylindrical, pluricellular, brown, deciduous; veins forked and copiously anastomosing with included veinlets; sori lateral on the veins, elongate, in a single series on each side of the midrib, slightly impressed, exindusiate; paraphyses apparently lacking, but sporangium stalks often present; sporangia long-stalked.

Paleotropics; ca. 40 species with 1 in Central America.

510. *Loxogramme mexicana* (Fée) C. Chr. Ind. Fil. Suppl. 3:125. 1934.

Selliguea mexicana Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 7]:43, t. 10, f. 4. 1857. TYPE: Sierra de S. Pedro Nolasco, Talea, Edo. Oaxaca, Mexico, *Juergensen 945* (P or RB not seen; isotype BM not seen).

Grammitis salvinii Hook. Sec. Cent. Ferns t. 71. 1861. TYPE: Vera Paz [Depto. Alta Verapaz?], Guatemala, 3500–5000 ft, *Salvin* (K not seen; probable isotype BM not seen).

Plants epipetric or epiphytic, at 1000–1900 m elevation, in forests, from the Fila de Cedral, Cerro Tablazo, and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Mexico, Guatemala, El Salvador, and Nicaragua.

CYATHEACEAE

Rhizomes often stout and clothed at least at the base with a thick covering of adventitious roots, forming an erect, tree-like trunk (usually short in *Cnemidaria*, ascending in *Lophosoria*, and creeping in *Metaxya*), scaly and sometimes spiny (only densely hairy at the apex in the latter genera), the scales concolorous or more commonly weakly to sharply bicolorous and the margins sometimes fimbriate or bearing minute, spine-like cells; fronds mostly large, borne at the apex of the erect or ascending rhizomes (scattered along the creeping rhizomes in *Metaxya*); stipes thick, often spiny at the base, mostly deciduous and revealing patterned scars in regular spirals on the rhizome; laminae 1–3(4)-pinnate, glabrous, hairy, or scaly, commonly with short, curved hairs on the adaxial surface of the costae and costules and with scales usually like those of the rhizome, sometimes dissimilar, often confined to the abaxial surface of the rachis, costae, and sometimes costules; veins free, simple or forked (and regularly forming costal areolae in *Cnemidaria*); sori round, surficial on the laminae; indusia absent, scale-like, shallowly or deeply cup-like, or mostly or completely enclosing the sporangia; sporangia with a short, thick stalk, angular capsules, and oblique annulus; paraphyses often abundant; spores trilete.

1. Caudices and stipe bases scaly, sometimes hairs also present; plants mostly arborescent (except in *Cnemidaria*)..3.

1. Caudices and stipe bases hairy, scales never present; plants not arborescent..2.

2(1). Laminae pinnate, not glaucous or pruinose abaxially; rhizomes creeping.

61. *Metaxya*

2(1). Laminae decompose, often glaucous or pruinose abaxially; rhizomes erect to ascending.

62. *Lophosoria*

3(1). Basal basicopic vein of each vein group arising from the costa or nearly so, not distal along the costule; cells of the body of the stipe scales (the protruding marginal and apical spine-like or fimbriate cells excepted) entirely uniform, the cells along the margin not different from the central ones. Stipe scales whitish to brown, linear, 0.5–1(1.5) mm wide, 3–5(6) cm long; indusia fragile, completely surrounding the sporangia, slightly apiculate at the apex.

66. *Sphaeropteris*

3(1). Basal basicopic vein of each vein group arising from the costule markedly distal to the costa; cells of the body of the stipe scales (any protruding marginal and apical spine-like or fimbriate cells excepted) not entirely uniform, the cells along the margin different from the central ones in size, shape, wall thickening, or orientation..4.

4(3). Stipe scales (and often those of the rachises and costae) provided with a dark (rarely pale) apical spine-like cell and sometimes similar, distant, spreading lateral cells, the scales concolorous to strongly bicolorous with the dark central band often several cells thick at the base and the pale to whitish margins often erose.

65. *Alsophila*

4(3). Stipe scales (and those of the rachises and costae) lacking apical or lateral spine-like cells (except in *C. poeppigii*, with approximate, ascending spine-like cells and in *Cyathea stipularis* and *trichiata*, with rather thin, fimbriate cells at entirely right angles to the margins), the scales concolorous to weakly bicolorous, the central band usually only 1 cell thick at the base..5.

5(4). Mature laminae usually 2-pinnate-pinnatifid, rarely 2-pinnate (merely pinnate or pinnate-pinnatifid in a few small species), the pinnules (or pinnae) regularly deeply pinnatifid (occasionally merely deeply lobed); costae and costules usually strigose adaxially, the hairs stiff and recurved; laminae often scaly or hairy abaxially, at least on the costae and costules; basal veins free and not connivent (except a transverse costal vein joining adjacent pinnate veins groups in *C. petiolata* and *williamsii*); indusia present or absent; rhizomes usually forming an obvious, erect trunk.

64. *Cyathea*

5(4). Mature laminae 1–2-pinnate, the pinnae or pinnules sometimes crenately lobed, rarely deeply lobed; costae and costules usually not strigose adaxially; laminae usually glabrous abaxially, the costules and costae occasionally scaly or hairy; basal veins of each vein group forming regular areolae along the costae or the basal veins connivent to the base of the sinus or occasionally meeting the sinus just distal to the base; sori usually in 1 medial, sinuous series; indusia present; rhizome usually not forming a trunk.

63. *Cnemidaria*

61. **METAXYA K. Presl**

Plants terrestrial; rhizomes creeping, woody, 8–15 mm in diam., hairy, the hairs pale tan to golden, multicellular, soft, rather straight; stipes stout, long, sparsely hairy, articulate to low phyllopodia; fronds large, monomorphic; laminae oblong, pinnate, papyraceous, glabrous, the rachis and costae adaxially sulcate; pinnae linear, acute at the base, acute-caudate at the apex; veins free, unbranched or 1-forked, at the apex arcuate and confluent with the cartilaginous pinna margin; sori surficial, irregularly disposed on the proximal portion of the veins, round or slightly elongate, exindusiate; paraphyses abundant, wooly, pluricellular; sporangia short-stalked.

Neotropical; monotypic.

ROY, S. K. and R. E. HOLTUM. 1965. Cytological and morphological observations on *Metaxya rostrata* (H.B.K.) Presl. *Amer. Fern J.* 55:158–164.

TRYON, R. M., Jr. 1970. The classification of the Cyatheaaceae. *Contr. Gray Herb.* 200:3–53.

511. *Metaxya rostrata* (H.B.K.) K. Presl, Tent. Pterid. 60. 1836.

Polypodium rostratum Humb. & Bonpl. ex Willd. *Sp. Pl.* ed. 4, 5:193. 1810, non Burm., 1768, nom. illeg. TYPE: Near S. Antonio de Yavita, Terr. Amazonas, Venezuela, *Humboldt* 966 (B-Hb. Willd. 19691 not seen Tryon photo).

Aspidium rostratum H.B.K. *Nov. Gen. Sp.* 1:12 (fol. 10). Jan 1816. TYPE: Effectively a renaming of *Polypodium rostratum* Humb. & Bonpl. ex Willd., and so based on the type of that name.

Polypodium humboldtii Poir. *Encyc. Méth. Suppl.* 4:497. Dec 1816. TYPE: A renaming of *Polypodium rostratum* Humb. & Bonpl. ex Willd., and so based on the type of that name.

Polypodium parkeri Hook. & Grev. *Icon. Fil.* 2:t. 232. 1831. TYPE: Mazaruni River, Guyana, *Parker* (K not seen).

Plants terrestrial, at 0–600 m elevation, in forests, from the Atlantic coastal plain of Costa Rica and Panama, Los Palmares and Cerro Turrubares (Pcia. S. José), the Peninsula de Osa and vicinity, the Canal Zone, Sta. Rita ridge (Pcia. Colón), La Campana (Pcia. Panama), and the northern part of the Chocó. Also from the Lesser Antilles, Mexico to Honduras, Nicaragua, Trinidad, Venezuela, Colombia to Bolivia, the Guianas, and Brazil.

62. **LOPHOSORIA K. Presl**

Plants terrestrial; rhizomes erect to ascending, forming a low caudex, hairy, the hairs pale tan to whitish, multicellular, rather stiff and straight; stipes stout, long, densely hairy at the base; fronds very large, monomorphic; laminae ovate, 4-pinnate, chartaceous, villous on the axes, the hairs whitish, pluricellular, soft, somewhat contorted, the rachis and costae (but not the costules) sulcate; pinnae oblong; pinnules oblong to lanceate, truncate at the base, acute-acuminate at the apex, the lateral segments deeply pinnatifid to pinnate, farinose on the abaxial surface, the farina deposited as a surficial coating or as a tomentum of minute



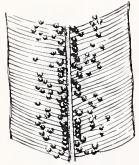
507 *Co. linearifolium*



508 *Co. rostratum*



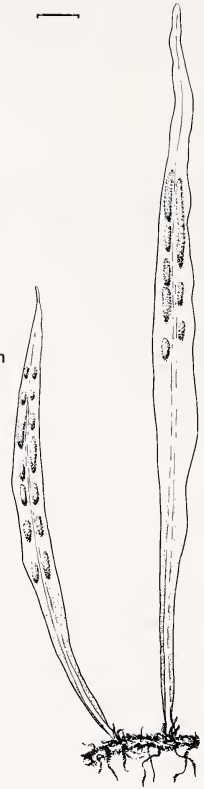
509 *Co. serrulatum*



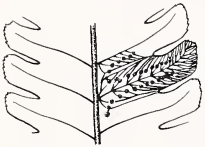
511 *M. rostrata*



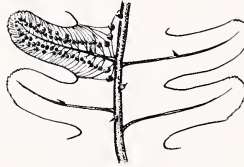
512 *Lop. quadripinnata*



510 *Lox. mexicana*



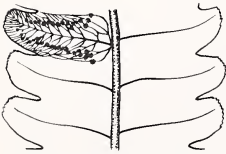
513 *Cn. chocoensis*



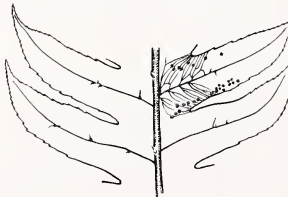
515 *Cn. cocleana*



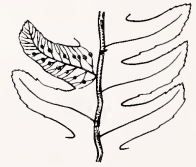
514 *Cn. choricarpa*



516 *Cn. ewanii*



517 *Cn. horrida*



518 *Cn. mutica* var. *chiricana*

rods; veins free, 1-forked; sori lateral on the veins, round, exindusiate; paraphyses few to abundant, catenate, lax; sporangia short-stalked.

Neotropical; monotypic.

TRYON, R. M., Jr. 1970. The classification of the Cyatheaceae. *Contr. Gray Herb.* 200:3–53.

512. *Lophosoria quadripinnata* (J. F. Gmel.) C. Chr. in Skottsbo. Nat. Hist. Juan Fernandez, Bot. 1:16. 1920.

Polypodium glaucum Swartz, Nov. Gen. Sp. Pl. Prodr. 134. 1788, non Thunb., 1784, nom. illeg. TYPE: Jamaica, Swartz (S not seen; isotype B-Hb. Willd. 19723 not seen microfiche S. I. Library).

Polypodium quadripinnatum J. F. Gmel. Syst. Nat. ed. 13, 2:1314. 1791. TYPE: A renaming of *Polypodium glaucum* Swartz, and so based on the type of that name.

Polypodium cinereum Cav. Descr. Pl. 248. 1801. TYPE: Chiloe, Née (MA not seen), seen by Christensen (*Dansk Bot. Ark.* 9(3):13. 1937).

Polypodium pruinatum Swartz, J. Bot. (Schrader) 1800(2):29. 1801; Syn. Fil. 41, 70. 1806, nom. superfl. TYPE: A renaming of *Polypodium cinereum* Cav., and so based on the type of that name.

Polypodium griseum Schkuhr, Vier Zwanzigste Kl. Linn. Pfl.-Syst. 2:25, t. 25b. 1805, nom. superfl. TYPE: A renaming of *Polypodium pruinatum* Swartz, and so based on the type of that name.

?*Polypodium caesium* K. Presl, Reliq. Haenk. 1:27. 1825. TYPE: Huánuco, Depto. Huánuco, Peru, Haenke (PRC not seen).

Alsophila millefolia Desv. Mém. Soc. Linn. Paris 6:320. 1827, as “*millefolium*.” TYPE: Plate 33 of Plumier’s “*Traité...*”, which is based on a specimen collected by Plumier on Hispaniola.

Cyathea discolor Bory in Duperrey, Voy. Coquille, Crypt. 6:281. 1829. TYPE: Chile, D’Urville (P-Hb. Bory not seen photo 3448; isotype L not seen photo 316).

Alsophila monticola Mart. Icon. Plant. Crypt. Bras. 75. 1834. TYPE: Villa Rica, Est. Minas Gerais, Freireiss (M not seen).

Lophosoria affinis K. Presl, Gefässbündel Farrn 37 (postpr. 345). 1847. TYPE: Caracas, Distr. Fed., Venezuela, Karsten 53 (PRC not seen).

Lophosoria polypodioides K. Presl, Gefässbündel Farrn 37 (postpr. 345). 1847. TYPE: Not stated.

Trichosorus glaucescens Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:283 (repr. 131). 1849. LECTOTYPE: Between Talea and the Hacienda de Sta. Gertrudis, Edo. Veracruz, Mexico, Aug 1842, *Liebmann Pl. Mex.* 2095, *Fl. Mex.* 875 (C not seen photo 5590; isoelectotype US), chosen by A. R. Smith (*Fl. Chiapas* 2:144. 1981).

Trichosorus glaucescens var. *major* Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:283 (repr. 131). 1849. TYPE: S. Yago Amatlan, Edo. Oaxaca, Mexico, 6000 ft, July 1842, *Liebmann Pl. Mex.* 2073 (C not seen photo 5591; isotype US).

Trichosorus densus Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:284 (repr. 132). 1849. LECTOTYPE: Cerro Chinautla, Edo. Puebla, Mexico, 7000 ft, Aug 1841, *Liebmann Pl. Mex.* 2083, *Fl. Mex.* 881 (C not seen photo 5592; isoelectotype US), chosen by A. R. Smith (*Fl. Chiapas* 2:144. 1981).

FIGS. 507–518. *Cochlidium*, *Loxogramme*, *Metaxya*, *Lophosoria*, and *Cnemidaria*. FIG. 507. Plant of *Co. linearifolium*, Stern et al. 533. FIG. 508. Plant of *Co. rostratum*, Wercklé (Hb. Jiménez 552). FIG. 509. Plant of *Co. serrulatum*, Brade 71. FIG. 510. Plant of *Lox. mexicana*, Brade & Brade 201. FIG. 511. Median portion of pinna of *M. rostrata*, Standley 27526. FIG. 512. Pinnule of *Lop. quadripinnata*, Killip 5256. FIG. 513. Median portion of median pinna of *Cn. chocoensis*, Lellinger & de la Sota 895. FIG. 514. Median portion of median pinna of *Cn. choricarpa*, Chrysler 5235. FIG. 515. Median portion of median pinna of *Cn. cocleana*, Wilbur 11111. FIG. 516. Median portion of median pinna of *Cn. ewanii*, Lellinger & de la Sota 178. FIG. 517. Median portion of median pinna of *Cn. horrida*, Pittier 1679. FIG. 518. Median portion of median pinna of *Cn. mutica* var. *chiricana*, Killip 5297.

Trichosorus frigidus Liebm. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. V, 1:284 (repr. 132). 1849. LECTOTYPE: Cerro de Zempoaltepec, Edo. Oaxaca, Mexico, 9000 ft, June 1842, Liebm. *Pl. Mex.* 2082, *Fl. Mex.* 884 (C not seen; isoelectotype US), chosen by A. R. Smith (*Fl. Chiapas* 2:144. 1981).

?*Alsophila schaffneriana* Fée, *Mém. Soc. Sci. Hist. Nat. Strasbourg* 5 [Mém. Foug. 8]: 109. 1857. TYPE: S. Martín near Huatusco, Edo. Veracruz, Mexico, *Schaffner* 232 (RB not seen).

?*Plecosorus leptocladon* Fée, *Icon. Esp. Nouv.* [Mém. Foug. 10]: 19, t. 34, f. 1. 1865. TYPE: Ocaña, Depto. Norte de Santander, Colombia, *Schlim* 438 (RB not seen).

Lophosoria prostrata Fée, *Crypt. Vasc. Brésil* 1:173. 1869. TYPE: Serra do Couto, Est. Rio de Janeiro, Brazil, *Glaziou* 3165 (P not seen photo 3446; isotype RB not seen).

Lophosoria acaulis Fée, *Crypt. Vasc. Brésil* 1:174. 1869. TYPE: Serra do Couto, Est. Rio de Janeiro, Brazil, *Glaziou* 3164 (P not seen photo 3447; isotype RB not seen).

Alsophila pruinata var. *conspicua* Sodiro, *Anales Univ. Quito* 12(80):232 (repr. 538). 1895. TYPE: Confluence of the Río Pilatón with the Toachi, Pcia. Pichincha, Ecuador, Sept 1892, *Sodiro* (Hb. Sodiro not seen; isotype P not seen photo 3396).

Alsophila contracta Hieron. *Hedwigia* 45:236. 1906, non Fée, 1869, nom. illeg. SYNTYPES: Between Pacasmayo and Moyobamba near Challuayacu and Tambo Centamala, Depto. S. Martín?, Peru, *Stuebel* 1066 (B not seen); and near Ines and Callecalle, Depto. Amazonas, Peru, 2600–3450 m, *Stuebel* 1067 (B not seen).

Alsophila pruinata var. *tenuis* Christ, *Bull. Herb. Boissier* II, 6:185. 1906. TYPE: Costa Rica, *Wercklé* (P not seen).

Alsophila bilineata Sodiro, *Anales Univ. Centr. Ecuador* 22:90 (repr. 13). 1908. TYPE: Mt. Pichincha, Pcia. Pichincha, Ecuador, April 1907, *Sodiro* (Hb. Sodiro not seen; isotype US).

Alsophila revoluta C. Chr. *Ind. Fil. Suppl.* 1:5. 1913. TYPE: A renaming of *Alsophila contracta* Hieron., and so based on the type of that name.

Plants terrestrial, at 1500–3000 m elevation, along roadsides, forest margins and in open areas, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito de Java, and the summit of Alto del Buey. Also from the Greater Antilles, Mexico to Nicaragua, Trinidad, Venezuela, Colombia to Bolivia, Brazil, Argentina, and Chile.

63. CNEMIDARIA K. Presl

Plants terrestrial; caudices ascending or erect, woody, rudimentary in most species or up to ca. 1.5(3.5) m long, often with a thick covering of adventitious roots, especially at the base, scaly, the scales mostly bicolorous, the central stripe dark brown, the margins whitish, commonly erose; stipes stout, long, smooth or spiny, scaly especially at the base, the scales like those of the rhizomes; fronds large, monomorphic; laminae oblong, pinnate or pinnate-pinnatifid, often with a conform terminal pinna, obtuse to truncate at the base, acute or obtusish at the apex, papyraceous or chartaceous, sparsely scaly and sometimes hairy on the rachis and costae, the lamina surface usually glabrous, the rachis and costae adaxially sulcate; pinnae oblong, obtuse to truncate at the base, acute, acuminate, or caudate at the apex, commonly broadly crenate; veins 1–4-forked or in pinnate groups, often with 1 or more lateral pairs anastomosing, confluent, or terminating at or distal to the sinus between lobes; sori lateral on the veins, in 1–4 sinuous series between the costules and the margin, the indusia saucer- to cup-shaped or subglobose; paraphyses rudimentary or lacking; sporangia short-stalked.

Neotropical; 25 species.

STOLZE, R. G. 1974. A taxonomic revision of the genus *Cnemidaria* (Cyatheaceae). *Fieldiana, Bot.* 37:1–98.

1. Basal veins united; costal areolae present. Sori in 1(2) series..6.

1. Basal veins free; costal areolae absent. Sori in 1–4 series..2.

2(1). Pinnae entire, minutely glandular abaxially; pinnae linear-lanceolate, subobtuse at the base, acuminate at the apex.

516a. *C. glandulosa*

2(1). Pinnae distinctly lobed, glabrous abaxially..3.

3(2). Pinna segments obtuse to round; rachises pilose on the adaxial and abaxial surfaces, the hairs curved, subappressed. Stipe base spines absent; pinna segments subentire, separated by narrow, acute sinuses; veins 1- or 2-forked; sori in 1 series.

518. *C. mutica* var. *chiricana*

3(2). Pinna segments acute to acuminate; rachises glabrous (except sometimes slightly pilose on the abaxial surface in *C. mutica* var. *grandis*)..4.

4(3). Lateral margins of the segments of the larger pinnae crenate to shallowly lobed; supra-basal sinuses round or the pinnae sometimes cut to the costa. Stipe base spines up to 2.5 mm long or rarely absent; veins 3-forked or pinnately branched; sori in 1–4 series.

520. *C. mutica* var. *grandis*

4(3). Lateral margins of the segments of the larger pinnae entire or nearly so; supra-basal sinuses acute..5.

5(4). Pinna segments more than 2 times longer than wide; pinnae cut more than 3/4 of the way to the costa. Stipe base spines up to 2.5 mm long or rarely absent; veins 1–4-forked; sori in 1 or 2 series.

521. *C. mutica* var. *mutica*

5(4). Pinna segments up to 1.5 times longer than wide; pinnae cut 1/2–3/4 of the way to the costa. Stipe base spines obsolete to absent; veins 1- or 2-forked; sori in 1 series.

519. *C. mutica* var. *contigua*

6(1). Pinnae entire to broadly serrate, narrowly elliptic-lanceolate; lateral pinnae obtuse to cuneate at the base, acute-acuminate at the apex.

522a. *C. stolzeana*

6(1). Pinnae decidedly lobed..7.

7(6). Pinna segments acute to acuminate at the apex; median pinnae cut 3/4 or more of the way to the costa; lateral pinnae up to 14 cm wide. Sori in 1 submarginal series.

517. *C. horrida*

7(6). Pinna segments round at the apex; median pinnae cut no more than 1/2 (2/3 in *C. cocleana*) of the way to the costa; lateral pinnae less than 8 cm wide..8.

8(7). Segment apices entire; laminae gradually reduced to a non-conform, narrowly triangular apex, the subapical lateral pinnae about 1/2 as long as the apex. Lateral pinnae 15–28 cm long, 2.5–6 cm wide.

514. *C. choricarpa*

8(7). Segment apices usually finely serrate; laminae abruptly reduced to a subconform, nearly oblong apex commonly bearing a pair of long, basal lobes at the base, the subapical lateral pinnae about as long as the apex..9.

9(8). Stipe bases lacking spines..11.

9(8). Stipe bases decidedly spiny..10.

10(9). Pinna segments approximate, the sinuses narrow (1–2 mm wide); indusia semicircular to almost circular, not completely surrounding the receptacle; costae and costules with broad, brown, deciduous scales on the abaxial surface. Lateral pinnae 25–40 cm long, 4.5–6 cm wide.

522. *C. spectabilis* var. *colombiensis*

10(9). Pinna segments distant, the sinuses U-shaped (3–5 mm wide); indusia circular, completely surrounding the receptacle; costae and costules lacking scales on the abaxial surface. Lateral pinnae ca. 40 cm long, 6 cm wide.

515. *C. cocleana*

11(9). Pinnae shallowly pinnatifid, incised ca. 1/4 of the way to the costa; veins from the costule simple or 1-forked, in larger specimens commonly laterally anastomosing to form an irregular row of costal areolae; scales on the axes entirely pale or with pale margins and a dull brown center. Lateral pinnae (10)15–45 cm long, (3)4–6 cm wide.

516. *C. ewanii*

11(9). Pinnae deeply pinnatifid, incised ca. 1/2 of the way to the costa; veins from the costule 1–3-forked, in larger specimens not laterally anastomosing, the costal areolae absent; scales on the axes with pale margins and a glossy brown center. Lateral pinnae (10)15–35 cm long, (2)3.5–7.5 cm wide.

513. *C. chocoensis*

513. *Cnemidaria chocoensis* Stolze, Fieldiana, Bot. 37:59, t. 20. 1974.

TYPE: Principal ridge and slopes 2 km east of S. José del Palmar, Depto. Chocó, 1550–1650 m, *Lellinger & de la Sota* 763 (US; isotypes COL, CR, F, HUA, LP).

Plants terrestrial, at 700–800 m elevation, in the Flora area known only from 0.3 km east of the road across the suspension bridge at ca. Km. 141 along the Ciudad Bolívar–Quibdó road, Depto. Chocó, 750 m (*Lellinger & de la Sota* 895, COL, CR, F, HUA, LP, US). Also from other localities in Colombia.

514. *Cnemidaria choricarpa* (Maxon) Tryon, Contr. Gray Herb. 200:51. 1970.

Hemitelia choricarpa Maxon, Contr. U. S. Natl. Herb. 16:40, t. 24d. 1912. TYPE: Buenos Aires, Pcia. Puntarenas, *Pittier* 4835 (US fragm NY).

Plants terrestrial, at 0–1800 m elevation, in forests, from 1 km north of La Hondura (Pcia. S. José), above Platanillo (Pcia. Cartago), the valley of the Río General, the Fila Costeña near S. Vito, the Peninsula de Osa, Cerro Jefe, Cerro Pirre, and the Chocó. Also from other localities in Colombia.

515. *Cnemidaria cocleana* Stolze, Fieldiana, Bot. 37:52, f. 17. 1974.

TYPE: La Mesa, 5 mi north of El Valle, Pcia. Coclé, *Tyson, Godfrey et al.* 2452 (FSU not seen Field Mus. photo F not seen GH not seen).

Plants terrestrial, at 500–1000(1200) m elevation, in forests, from Fortuna Lake (Pcia. Bocas del Toro), near Sta. Fé, El Valle, above El Copé (Pcia. Coclé), and the upper Río Tuquesa (Pcia. Darién).

516. *Cnemidaria ewanii* (Alston) Tryon, Contr. Gray Herb. 200:52. 1970.

Cyathea ewanii Alston, J. Wash. Acad. Sci. 48:231. 1958. TYPE: Between Mocoa and Urcusique, Depto. Putamayo, Colombia, 900 m, *Ewan* 16729 (BM not seen; isotypes GH not seen, MO not seen, UC, US).

Plants terrestrial, at 0–800 m elevation, in forests, from the foot of Alto del Buey and Istmina (Depto. Chocó). Also from Colombia and Ecuador.

516a. *Cnemidaria glandulosa* Stolze, Amer. Fern J. 74:101, f. 1. 1984.

TYPE: North of S. Felix on Cerro Colorado copper mine road, Pcias. Chiriquí–Bocas del Toro, 5000–5500 ft, *Mori & Kallunki* 5908 (US; isotype MO not seen).

Plants terrestrial, at 1500–1600 m elevation, known only from the type.

517. *Cnemidaria horrida* (L.) K. Presl, Tent. Pterid. 57. 1836.

Polypodium horridum L. Sp. Pl. 2:1092. 1753. LECTOTYPE: Plate 4 of Plumier's "Description...", chosen by Stolze (*Fieldiana*, Bot. 37:42. 1974).

Cyathea commutata Spreng. Anleit. Kenntn. Gew. 3:146, t. 3, f. 32. 1804. TYPE: Santo Domingo [Hispaniola], collector unknown (LZ destroyed).

Hemitelia hookeri Fée, Gen. Fil. [Mém. Foug. 5]:349. 1852. TYPE: Based on *H. horrida* sensu Hooker (Sp. Fil. 1:30, t. XV. 1866) syn. excl., and so the plate (or a specimen from which the plate was drawn) must be the type.

Hemistegia repanda Fée, Gen. Fil. [Mém. Foug. 5]:351. 1852. TYPE: Cuba, *Linden* (RB not seen).

Plants terrestrial, at 700–1400 m elevation, in forests, from along the Río Sarapiquí between Cariblanco and S. Miguel (Pcia. Alajuela) and Pies de Sta. Barbara (Pcia. Heredia). Also from the Greater Antilles, St. Thomas, Venezuela, and Colombia to Peru.

518. *Cnemidaria mutica* var. *chiricana* (Maxon) Stolze, Fieldiana, Bot. 37:35. 1974.

Hemitelia chiricana Maxon, Contr. U. S. Natl. Herb. 16:33, t. 20. 1912. TYPE: Between Alto de las Palmas and the top of Cerro de la Horqueta, Pcia. Chiriquí, 2100–2268 m, *Maxon 5519* (US).

Plants terrestrial, at 1200–2200 m elevation, in forests, from near Tapantí, around Boquete, and near Sta. Fé. Also from Venezuela.

519. *Cnemidaria mutica* var. *contigua* (Maxon) Stolze, Fieldiana, Bot. 37:37. 1974.

Hemitelia contigua Maxon, Contr. U. S. Natl. Herb. 16:32, t. 18. 1912. TYPE: 5 mi south of Cartago, Pcia. Cartago, ca. 1800 m, *Maxon 523* (NY fragm US).

Plants terrestrial, at 1200–2100 m elevation, in forests, from El Socorro de S. Ramón (Pcia. Alajuela), the Cordillera Central, and the north end of the Cordillera de Talamanca.

520. *Cnemidaria mutica* var. *grandis* (Maxon) Stolze, Fieldiana, Bot. 37:36. 1974.

Hemitelia grandis Maxon, Contr. U. S. Natl. Herb. 16:37, t. 23. 1912. TYPE: Vicinity of Coliblanco, Pcia. Cartago, ca. 1950 m, *Maxon 307* (US; isotype NY).

Hemitelia nudis Maxon, Contr. U. S. Natl. Herb. 17:413, t. 16. 1914. TYPE: Holcomb's Trail above Boquete, Pcia. Chiriquí, ca. 1750 m, *Maxon 5682* (US; isotypes CR, GH not seen, NY).

Plants terrestrial, at 900–1900 m elevation, in forests, from north of S. Ramón, the Cordillera Central, Tuis (Pcia. Cartago), the Cordillera de Talamanca to Pcia. Chiriquí, and near Sta. Fé.

521. *Cnemidaria mutica* (Christ) Tryon, Contr. Gray Herb. 200:52. 1970, var. *mutica*.

Hemitelia mutica Christ, Bull. Soc. Bot. Genève II, 1:233. 1909. LECTOTYPE: Turrialba, Pcia. Cartago, 850 m, *Wercklé* (P not seen fragm US), chosen by Stolze (Fieldiana, Bot. 37:34. 1974).

Hemitelia horrida var. *hetersora* Rosenst. Repert. Spec. Nov. Regni Veg. 10:275. 1912. TYPE: Río Chis near Juan Viñas, Pcia. Cartago, ca. 1200 m, *Brade & Brade 451* (S not seen fragm US).

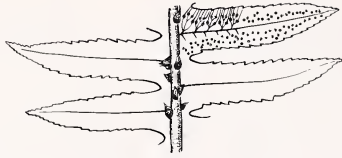
Hemitelia pittieri Maxon, Contr. U. S. Natl. Herb. 16:32, t. 19a. 1912. TYPE: Valle de Agua Buena, Cañas Gordas, Pcia. Puntarenas, *Pittier 10969 p. p.* (US fragm F not seen). The type collection is partly *C. choricarpa* (CR not seen).

Hemitelia arachnoidea Maxon, Contr. U. S. Natl. Herb. 16:34, t. 21a, b. 1912, non *Cyathea arachnoidea* Hook., 1865. TYPE: Vicinity of La Palma, Pcia. S. José, 1450–1550 m, *Maxon 451* (US; isotype NY).

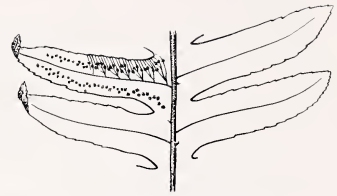
Cyathea subarachnoidea Domin, Rozpr. Král. Česk. Společn. Nauk, Tr. Mat. Přír. 2 [Pterid. Dominica]: 264. 1929. TYPE: A renaming of *Hemitelia arachnoidea* Maxon, and so based on the type of that name.



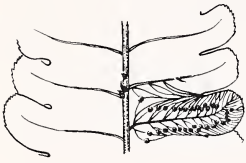
519 *Cn. mutica* var. *contigua*



520 *Cn. mutica* var. *grandis*



521 *Cn. mutica* var. *mutica*



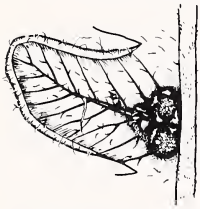
522 *Cn. spectabilis* var. *colombiensis*



523 *Cy. acutidens*



524 *Cy. aterrima*

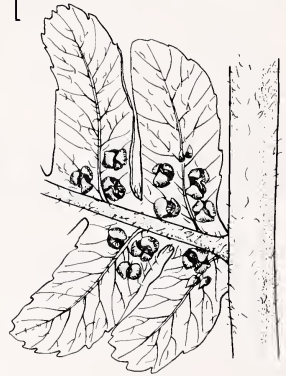


525 *Cy. caracasana* var. *maxonii*

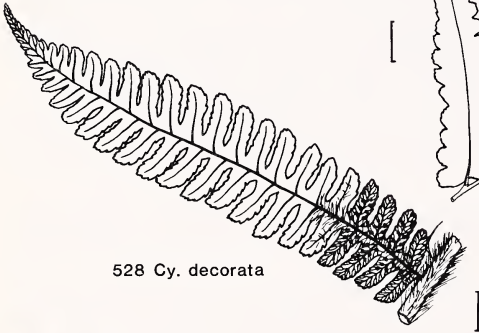


527 *Cy. costaricensis*

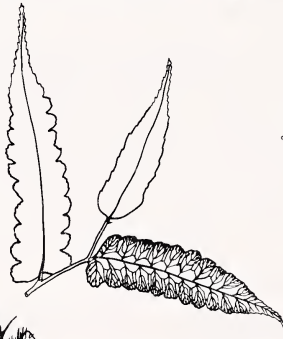
.5 cm



529 *Cy. delgadii*



528 *Cy. decorata*



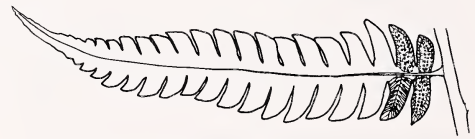
526 *Cy. conformis*



531 *Cy. falcata*



532 *Cy. fulva*



530 *Cy. divergens* var. *divergens*

Plants terrestrial, at (400)1000–2100 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and northwest of Sta. Fé. Also from Venezuela.

522. *Cnemidaria spectabilis* var. *colombiensis* Stolze, Fieldiana, Bot. 37:63, f. 21. 1974.

TYPE: Córdoba, Depto. Valle, Colombia, 80–100 m, *Killip 5039* (US; isotypes GH not seen, NY).

Plants terrestrial, at 0–500 m elevation, in forests, from the central Chocó.

522a. *Cnemidaria stolzeana* Gómez, Phytologia 50:457. 1982.

TYPE: Beyond sawmill on lumber road above El Copé, Pcia. Coclé, 900 m, *Hammel 1036* (CR not seen; isotype MO).

Plants terrestrial, at 900–ca. 1500 m, in forests, known only from the type and from beyond the R. Tres Brazos 9 km from Sta. Fé (*Croat 25601*, MO).

64. CYATHEA J. E. Smith

Plants terrestrial, arborescent; caudices erect, woody, sometimes with a thick covering of adventitious roots, especially at the base, scaly, the scales concolorous or bicolorous, sometimes erose or toothed; stipes stout, short to long, smooth or spiny, scaly and sometimes hairy, the scales concolorous or bicolorous, the marginal cells different in shape and orientation from the central ones, rarely bearing spine-like marginal cells, the hairs minute, the stipes also scurfy with minute, appressed hairs or amorphous scales; fronds large, monomorphic; laminae ovate to oblong, rarely pinnate, usually 2-pinnate-pinnatifid or occasionally more divided, tapered to a non-conform, pinnatifid apex, or 1- or 2-pinnate and often with a conform apex, chartaceous to coriaceous; veins free or rarely forming costal areolae, simple to 2-forked; sori lateral or rarely terminal on the veins, round, exindusiate or indusiate, the indusium an entire or partial, evanescent sphere, a firm, cup- or saucer-like structure, or a firm to thin, obvious to obscure scale sometimes hidden by the sporangia; paraphyses present or absent, or rarely the sporangia mixed with a few scales; sporangia short-stalked.

Neotropical with a few species in the Western Pacific; ca. 120 species.

BARRINGTON, D. S. 1978. A revision of the genus *Trichopteris*. *Contr. Gray Herb.* 108:1–93.

LELLINGER, D. B. 1988. The disposition of *Trichopteris* (Cyatheaceae). *Amer. Fern J.* 78:90–94.

TRYON, R. M., Jr. 1976. A revision of the genus *Cyathea*. *Contr. Gray Herb.* 206:19–98.

WINDISCH, P. G. 1977. Synopsis of the genus *Sphaeropteris* (Cyatheaceae) with a revision of the neotropical exindusiate species. *Bot. Jahrb. Syst.* 98:176–198.

FIGS. 519–532. *Cnemidaria* and *Cyathea*. FIG. 519. Median portion of median pinna of *Cn. mutica* var. *contigua*, Maxon 8220. FIG. 520. Median portion of median pinna of *Cn. mutica* var. *grandis*, Lellinger 777. FIG. 521. Median portion of median pinna of *Cn. mutica* var. *mutica*, Killip 5156. FIG. 522. Median portion of median pinna of *Cn. spectabilis* var. *colombiensis*, Killip 35377. FIG. 523. Pinnule of *Cy. acutidens*, Lellinger 804. FIG. 524. Basal segment of pinnule of *Cy. aterrima*, Cuatrecasas 15190, Colombia. FIG. 525. Ultimate segment of *Cy. caracasana* var. *maxonii*, Scamman & Holdridge 7868. FIG. 526. Pinna apex of *Cy. conformis*, Stern & Chambers 188. FIG. 527. Basal portion of median pinna of *Cy. costaricensis*, Mickel 2861. FIG. 528. Pinna of *Cy. decorata*, Killip & Cuatrecasas 38914, Colombia. FIG. 529. Basal portion of pinnule of *Cy. delgadii*, White & Lucansky 196823. FIG. 530. Pinnule of *Cy. divergens* var. *divergens*, Maxon 351. FIG. 531. Median pinna of *Cy. falcata*, Sytsma, Andersson & Brenner 4415 (MO). FIG. 532. Pinnule of *Cy. fulva*, Wilbur & Stone 10623.

1. Sori exindusiate..15.

1. Sori indusiate, the indusia various, from fully enclosing the sori to a small, basal, scale-like structure sometimes hidden by the sporangia..2.

2(1). Indusia completely enclosing the immature sori, fragile and usually evanescent, often persisting only as an irregular, basal fragment..10.

2(1). Indusia partially surrounding the immature sori, commonly firm, often splitting into a few fragments at maturity or remaining as an entire or partial basal cup or small scale-like structure sometimes hidden by the sporangia..3.

3(2). Pinnae pinnate to 2-pinnate..5.

3(2). Pinnae entire to pinnatifid..4.

4(3). Rhizome and stipe base scales whitish; laminae elliptic-lanceolate, acute at the base and apex, ca. 1 m long, 25 cm wide; rachises and costae densely pilose.

528. *C. decorata*

4(3). Rhizome and stipe base scales brown with white margins; laminae lanceolate, obtuse at the base, the basal pinnae deflexed, narrowly acute at the pinnatifid apex, ca. 30–35 cm long, 12–15 cm wide; rachises densely pilose; costae sparsely scaly.

545. *C. pseudonanna*

5(3). Pinnules, or most of them, entire to lobed..8.

5(3). Pinnules pinnatifid to pinnate..6.

6(5). Pinnules stalked 1–4 mm; ultimate segments more than 1 cm long, entire, the basal ones usually slightly tapered at the base and not fully adnate. Stipe base and lamina scales pale, the larger ones with a reddish-brown center; basal pinnule segments smaller than the distal ones.

534. *C. holdridgiana*

6(5). Pinnules sessile or stalked no more than 1 mm; ultimate segments conspicuously toothed, or if entire then less than 1 cm long, the basal ones broadly adnate..7.

7(6). Costae and veins conspicuously pilose on both surfaces; veins (1)2-forked; scales on the abaxial surface of the costae bullate or plane, whitish; ultimate segments decidedly serrate; receptacle with stout paraphyses.

523. *C. acutidens*

7(6). Costae and veins sparsely strigose or lacking hairs on both surfaces; veins 1(2)-forked; scales on the abaxial surface of the costae bullate or plane, pale brown, golden, or rarely dark brown; ultimate segments often entire or crenate; receptacles lacking stout paraphyses.

538. *C. multiflora*

8(5). Laminae gradually or abruptly tapered to a pinnatifid apex. Caudex up to 3 m long; pinnae lanceate, tapered to a non-articulate, pinnatifid apex; pinnules up to 2.5 cm wide, not articulate; medial veins often anastomosing to form a subcontinuous series of costal areolae; sori submarginal.

541. *C. petiolata*

8(5). Laminae with a conform terminal pinna, not a pinnatifid apex..9.

9(8). Lateral pinnules cordate at the base; apical pinnules articulate; laminae glabrous on the abaxial surface; sori submarginal. Caudex up to 8 m long; pinnae linear; pinnules up to 1.5 cm wide; medial veins occasionally anastomosing to form a discontinuous series of costal areolae.

526. *C. conformis*

9(8). Lateral pinnules obtuse at the base; apical pinnules not articulate; laminae short-pubescent abaxially; sori nearly medial. Pinnules ca. 1 cm wide; medial veins not anastomosing.

535. *C. impar*

10(2). Basal and suprabasal pinnules sessile or nearly so..12.

10(2). Basal and suprabasal pinnules stalked (1.5)2 mm or more..11.

11(10). Rachises and stipes stramineous; costae stramineous; basal and suprabasal pinnules stalked 2–10 mm; stipe base scale margins whitish. Pinnules up to 3.5 cm wide, glabrous except for a few deciduous scales on the abaxial surface of the costules; stipes up to 3 m long.

530. *C. divergens* var. *divergens*

11(10). Rachises and stipes atropurpureous; costae atropurpureous to brown; basal and suprabasal pinnules stalked (1.5)2–8 mm; stipe base scale margins golden. Pinnules up to 3(3.5) cm wide, glabrous abaxially except for a few deciduous scales on the costules; stipes up to 2 m or more long.

533. *C. gracilis*

12(10). Adaxial surface of the segments bearing subdeciduous, short, lax, irregularly twisted hairs on and sometimes between the veins. Stipe base scales nearly linear, concolorous, medium brown with slightly paler margins; segments sparsely pilosulous on the abaxial surface of the veins and with bullate and plane, whitish to tan scales on the costules.

548. *C. suprastrigosa*

12(10). Adaxial surface of the segments glabrous or with short to long, stiff hairs only on the veins..13.

13(12). Veins of the segments on the abaxial surface with slightly curved, whitish, stiff hairs ca. 0.75 mm long. Stipe base scales nearly linear, concolorous, medium brown with slightly paler margins; golden brown, bullate or plane scales present on the abaxial surface of the costae and costules.

529. *C. delgadii*

13(12). Veins of the segments on the abaxial surface glabrous (translucent hairs sometimes present on the costules)..14.

14(13). Costules of the segments lacking hairs on the abaxial surface; pinnules of median pinnae (1)1.5–2 cm wide; stipe base scales mostly bicolorous with a dark, central area and wide to narrow, pale margins.

525. *C. caracasana* var. *maxonii*

14(13). Costules of the segments with lax, translucent hairs on the abaxial surface; pinnules of median pinnae 1–1.5(2) cm wide; stipe base scales concolorous, medium brown with paler margins.

532. *C. fulva*

15(1). Fronds pinnate or pinnate-pinnatifid..18.

15(1). Fronds 2-pinnate-pinnatifid..16.

16(15). Costules usually with many, long, straight or curved hairs 0.25–1.25(2) mm long on the abaxial surface..22.

16(15). Costules with a few short, straight hairs less than 0.5 mm long or with cobwebby hairs on the abaxial surface. Short, stiff hairs absent between the veins on the abaxial surface of the laminae..17.

17(16). Rachises and costae abaxially glabrous or nearly so..26.

17(16). Rachises and costae abaxially with a close covering of matted hairs and small scales..28.

18(15). Fronds pinnate-pinnatifid or rarely more divided, the pinnae deeply lobed, usually pinnatifid..21.

18(15). Fronds pinnate, the pinnae entire to shallowly lobed..19.

19(18). Plants diminutive, the fronds ca. 0.5 m long, ca. 5–10 cm wide; sori in 1 series on each side of the costae; pinnae entire to shallowly lobed.

531. *C. falcata*

19(18). Plants medium-sized, the fronds ca. 1 m long, more than 10 cm wide; sori in 2 or 3 series on each side of the costae; pinnae entire to repand..20.

20(19). Vein groups often anastomosing to form costal areolae; laminae glabrous abaxially. Laminae ca. 60 cm long, 20 cm wide; sori in 2 rows on each side of the costae.

553. *C. williamsii*

20(19). Vein groups not anastomosing or forming costal areolae; laminae sparsely castaneous-glandular abaxially. Laminae ca. 40–50 cm long, 20 cm wide; sori in 2 or 3 rows on each side of the costae.

547a. *C. stolzei*

21(18). Stipes predominantly with narrow, brownish scales; laminae 1–1.5 m long, 30–45 cm wide; basal pinnae less than 1/2 as long as the longest pinnae.

550. *C. ursina*

21(18). Stipes predominantly with narrow, whitish hairs; laminae 30–75 cm long, 15–25 cm wide; basal pinnae 2/3 as long as the longest pinnae.

542. *C. phalaenolepis*

22(16). Veins on the adaxial surface of the laminae glabrous..25.

22(16). Veins on the adaxial surface of the laminae with straight to curved hairs..23.

23(22). Segments entire or faintly crenate; scales on the costules longer than the hairs, not bullate, irregularly ciliate. Paraphyses very twisted, forming a mat, not exceeding the sporangia.

536. *C. lockwoodiana*

23(22). Segments decidedly crenate-serrate; scales on the costules or veins shorter than the hairs, bullate, not ciliate..24.

24(23). Stipes spiny, the scales few and deciduous; pinnae caudate at the apex. Fronds 2–3.5 m long; stipe bases spiny; largest pinnules 15–25 mm wide; scales on the adaxial surface of the costules lanceolate, white, ca. 2 mm long; scales on the costules of the ultimate segments bullate, white.

549. *C. trichiata*

24(23). Stipes not spiny, the scales abundant, linear, distantly toothed, reddish-tan, persistent; pinnae acute to acuminate at the apex. Paraphyses nearly straight, exceeding the sporangia; scales of the costae linear, whitish, plane.

524. *C. aterrima*

25(22). Laminae abaxially hairy only on the costules and veins. Fronds 2–4 m long; largest pinnules 13–15(20) mm wide; costules abaxially with broadly lanceolate, reddish-brown scales.

547. *C. stipularis*

25(22). Laminae abaxially hairy between the veins, as well as on the costules and veins. Fronds up to 2.5 m long; laminae ovate, lanceolate, or oblanceolate, ca. 1.5–1.75 m long, 0.8–1 m wide; costules of the ultimate segments with bullate, whitish scales.

543. *C. pilosissima*

26(17). Sori bearing 1–few, ovate-acuminate, whitish scales at the base of the receptacle. Stipe bases very slightly spiny; fronds ca. 3 m long; rachises and costae pale brown to nearly stramineous; pinnules acute-acuminate; ultimate segments up to 2.5 mm wide, crenate-serrate, obtuse to acute at the apex; scales on the costules and veins plane or nearly so, whitish to pale brown, fimbriate.

527. *C. costaricensis*

26(17). Sori not bearing basal scales..27.

27(26). Costules and veins glabrous or sparsely hairy on the abaxial surface, the hairs commonly irregularly branched, appearing somewhat stellate; pinnules spreading.

544. *C. poeppigii*

27(26). Costules and veins villous on the abaxial surface; pinnules ascending. Stipe base scales linear, ca. 25 mm long, 1.5 mm wide.

551. *C. villosa*

28(17). Costae sparingly spiny. Costules sparingly scaly on the abaxial surface, the scales lanceate or acicular; paraphyses pale; pinnules 10–18(20) mm wide.

537. *C. microdonta*

28(17). Costae not spiny..29.

29(28). Costae and costules abaxially with dark brown, predominantly bullate scales ca. 0.3–0.5 mm long and wide. Stipes spiny, ca. 1 m long; laminae lanceolate or ovate-lanceolate, ca. 1.5 m long, 1.2 m wide; largest pinnules ca. 15 mm wide.

546. *C. schiedeana*

29(28). Costae and costules abaxially with predominantly lanceolate to linear, plane or slightly bullate scales more than 0.5 mm long..30.

30(29). Pinnules 2–2.5 cm wide; rachises and costae abaxially with small, irregular, brown, subbullate scales with a long, bristle-like apex. Pinnules gradually attenuate at the apex, the costules abaxially with brown, plane, fimbriate scales.

552. *C. wendlandii*

30(29). Pinnules less than 2(2.5) cm wide; rachises and costae lacking such scales on the abaxial surface.31.

31(30). Laminae pale brown abaxially; narrow, linear scales 2–5 mm long present on the costae, especially at the pinnule bases; hairs absent. Stipes spiny, ca. 0.5–0.7 m long; laminae ovate or ovate-lanceolate, 1.2–1.5 m long, 0.7–0.8 m wide.

539. *C. nigripes* var. *brunnescens*

31(30). Laminae pale green abaxially; narrow, rather stiff, straight hairs present on the abaxial surface of the costae; scales absent. Stipes spiny, 0.6–0.8 m long; laminae ovate-lanceolate, 1.4–1.7 m long, ca. 1 m wide.

540. *C. nigripes* var. *nigripes*

523. *Cyathea acutidens* (Christ) Domin, Pteridophyta 262. 1929.

Alsophila leucolepis var. *pubescens* Christ in Pitt. Prim. Fl. Costaric. 3(1):42. 1901. SYNTYPES: Cerro Cañas Gordas, Pcia. Puntarenas, 1100 m, *Pittier 10981* (BR or P not seen; isosyntypes CR, UC, US), *10989* (BR not seen photo 4899 fragm NY; isosyntypes CR, NY, US), and *10992* (BR not seen photo 4898; isosyntypes CR, P not seen, US).

Alsophila acutidens Christ, Bull. Herb. Boissier II, 6:186. 1906. TYPE: Based on *Alsophila leucolepis* var. *pubescens* Christ in Pitt., and so based on the syntypes of that name.

Plants terrestrial, at 1100–1200 m elevation, in forests, from the Fila Costeña.

524. *Cyathea aterrima* (Hook.) Domin, Pteridophyta 262. 1929.

Alsophila aterrima Hook. Syn. Fil. 38. 1866. TYPE: Near Tarapoto, Depto. S. Martín, Peru, *Spruce 4713* (K not seen; isotypes BM not seen, P not seen, US).

Alsophila mollicula Maxon, J. Arnold Arbor. 27:440. 1946. TYPE: Between Sta. Marta and Marsella, Depto. Caquetá, Colombia, *Woronov & Juzepczuk 6415* (US; isotypes LE not seen Tryon photo not seen).

Dryopteris macarenensis Alston, Mutisia 7:5. 1952. TYPE: North escarpment of the Sierra de la Macarena, Intend. Meta, Colombia, 800 m, *Philipson 2281* (BM not seen; isotype COL not seen).

Alsophila scopulina Tryon, Rhodora 62:2, f. 2. 1960. TYPE: Summit of Cerro Isibukuri, Río Kananari, Depto. Vaupés, Colombia, *Schultes & Cabrera 13411* (GH not seen; isotypes B not seen, BM not seen, NY not seen, U not seen, US).

Alsophila lechria Tryon, Rhodora 62:4, t. 1251. 1960. TYPE: Mesa de Los Santos, Depto. Santander, Colombia, 1500 m, *Killip & Smith 15202* (GH not seen; isotypes NY not seen, US).

Plants terrestrial, at 1400–1800 m elevation, in forests, in the Flora area known only from the northwest side of Alto del Buey (*Lellinger & de la Sota 246*, BM, COL, CR, HUA, LP, US). Also from Venezuela, Colombia and Peru.

525. *Cyathea caracasana* var. *maxonii* (Underw. in Maxon) Tryon, Contr. Gray Herb. 206:83. 1976.

Cyathea membranulosa Christ, Bull. Herb. Boissier II, 7:271. 1907. SYNTYPES: La Palma, Pcia. S. José, 1500 m, *Wercklé 17080* (P not seen; isotype CR not seen), and S. Pascon, Costa Rica, 1500 m, *Wercklé 17024* (P not seen; isotype CR not seen).

Cyathea maxonii Underw. in Maxon, North Amer. Fl. 16:82. 1909, as “*maxoni*.” TYPE: Mountains 5 mi south of Cartago, Pcia. Cartago, 1800 m, *Maxon 524* (NY; isotype US).

Plants terrestrial, at 1100–2900 m elevation, in forests, from north of S. Ramón, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and the Fila Costeña.

526. *Cyathea conformis* (Tryon) Stolze, Fieldiana, Bot. 37:80. 1974.

Hemitelia conformis Tryon, Rhodora 62:1, f. 1. 1960. TYPE: Piñas Bay, Pcia. Darién, *Stern & Chambers 188* (GH; isotypes A not seen, MO, US, Y not seen).

Plants terrestrial, at 0–100 m elevation, in forests, from the Pacific coast of Pcia. Darién. Also from the Pacific coast of Colombia south of the Chocó.

527. *Cyathea costaricensis* (Klotzsch ex Kuhn) Domin, Acta Bot. Bohem. 9:107. 1930.

Hemitelia costaricensis Klotzsch ex Kuhn, Linnaea 36:159. 1869. LECTOTYPE: “Costa Rica et Veragua,” Warszewicz 36 (B not seen frags NY, US), chosen by Barrington (Contr. Gray Herb. 208. 76. 1978).

Plants terrestrial, at 100–1500(2400) m elevation, in forests, from the Pacific slopes of the Cordillera de Tilarán, La Palma, near El Empalme (Pcias. Cartago–S. José), near Remedios (Pcia. Chiriquí), and Cerro Galera ca. 2 km from the Pacific Ocean (Canal Zone). Also from Mexico to Nicaragua.

528. *Cyathea decorata* (Maxon) Tryon, Contr. Gray Herb. 200:50. 1970.

Hemitelia decorata Maxon, J. Arnold Arbor. 27:439, t. 1. 1946. TYPE: Along the Río Yurumangui, Depto. El Valle, Colombia, 5–50 m, *Cuatrecasas* 15737 (US; isotype F not seen).

Plants terrestrial, at 0–300 m elevation, from the upper Río S. Juan area. Also from Depto. El Valle, Colombia.

529. *Cyathea delgadii* Sternb. Vers. Fl. Vorwelt 1:47, t. B. 1820.

Cyathea vestita Mart. Denkschr. Königl.-Baier. Bot. Ges. Regensburg 2:146. 1822. SYNTYPES: “Prov. Sebastianopolitanae” [Est. Rio de Janeiro, Brazil], *Martius* (M not seen) “et Pauliae” [Est. S. Paulo, Brazil], *Martius* (M not seen); and Serra dos Pilões, Est. Goiás, Brazil, *Pohl* (M? not seen), according to *Martius* (Icon. Pl. Crypt. Bras. 75. 1834).

Cyathea oligocarpa Kunze, Linnaea 9:101. 1834. TYPE: Pampayacu, Depto. Huánuco, Peru, *Poeppig* *Diar.* 1101 (LZ destroyed; isotypes *Poeppig* 218, B not seen, MO, P not seen). *Poeppig*’s diary numbers and his specimen numbers are not identical.

Cyathea hirtula Mart. Icon. Pl. Crypt. Bras. 76, t. 53. 1834. TYPE: Alamada, Serra do Mar, Est. Bahía, Brazil, *Maxmillian von Wied-Neuwied* (LE? or M? not seen photo BR, fragm BM not seen).

Cyathea schanschin Mart. Icon. Pl. Crypt. Bras. 77, t. 54. 1834. SYNTYPES: Presumably based on several *Martius* collections from Brazil (M none seen), Peru, *Haenke* (BR? not seen), and Peru, *Poeppig* (BR? not seen).

Cyathea denticulata Goldm. in Meyen, Nov. Actorum Acad. Caes. Leop.-Carol. Nat.Cur. 19, Abh. 1:466. 1843. TYPE: Corcovado, Est. Rio de Janeiro, Brazil, *Meyen* (B not seen).

Cyathea feei Glaziou in Fée, Crypt. Vasc. Brésil 1:179, t. 66, f. 2. 1869. LECTOTYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Glaziou* 2286 (P not seen photo GH not seen fragm NY not seen), chosen by Tryon (Contr. Gray Herb. 206:72. 1976).

Cyathea sphaerocarpa Fée, Crypt. Vasc. Brésil 1:180, t. 53, f. 2. 1869. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Glaziou* 2283 (P not seen Tryon photo GH not seen).

Cyathea abruptecaudata Fée, Crypt. Vasc. Brésil 1:183, t. 62, f. 2. 1869. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Glaziou* 2284 (P not seen photo GH not seen fragm NY; isotype US).

Cyathea pilosa Baker, Syn. Fil. ed. 2. 19. 1874. TYPE: Tarapoto, Depto. S. Martín, Peru, *Spruce* 4729 (K not seen photo 8110; isotypes GH not seen, P not seen photo GH not seen, fragm F not seen; fragm US).

Cyathea copelandii Kuhn & Luerssen in R. Copel. Abh. Naturwiss. Vereine Bremen 7:278. 1882. TYPE: Ilha da Trindade, Brazil, R. *Copeland* (K? not seen; isotype fragm P not seen Tryon photo GH not seen).

Cyathea hypotricha Christ, Bull. Herb. Boissier II, 4:947. 1904. TYPE: Costa Rica, *Wercklé* (P not seen fragm NY).

Cyathea bahiensis Rosenst. Repert. Spec. Nov. Regni Veg. 20:90. 1924. TYPE S. Gomala, Rio Femmeas region, Est. Bahía, Brazil, *Luetzelburg* 12534 (M not seen photo BM not seen).

Cyathea micromera Rosenst. Repert. Spec. Nov. Regni Veg. 20:90. 1924. TYPE: Apertada-hora, Est. Goiás, Brazil, *Luetzelburg 12841* (M not seen photo BM not seen).

Cyathea trinidadensis Brade, Arq. Inst. Biol. Veg. 3:1, t. 1, f. 1. 1936. TYPE: Ilha da Trindade, Brazil, *Campos Porto 579* (RB not seen; isotype F not seen).

TYPE: Gancho do Generale Delgado along the road to Caldas Novas, Est. Goiás, Brazil, *Pohl* (PRC not seen frags GH not seen and probably US).

Plants terrestrial, at 500–1500(2900) m elevation, in forests, from north of S. Ramón, the Cordillera Central, Tuis and Platanillo (both Pcia. Cartago), the Cordillera de Talamanca to Villa Mills (Pcia. Cartago), the Fila Costeña near S. Vito, above Sta. Fé, El Valle, Cerro Campana and Cerro Jefe (both Pcia. Panama), and Cerro Pirre. Also from Venezuela, Colombia to Bolivia, Guyana, Brazil, Paraguay, and Argentina.

530. *Cyathea divergens* Kunze, *Linnaea* 9:100. 1834, var. *divergens*.

Cyathea equestris Kunze, *Linnaea* 9:100. 1834. TYPE: Cerro de Cristóbal near Pampayacu, Depto. Huánuco, Peru, July 1829, *Poeppig* (LZ destroyed fragm K not seen Tryon photo GH not seen), synonymized by Mettenius in Tr. & Planch. (Ann. Sci. Nat. Bot. V, 2:265 (repr. 347). 1864).

Cyathea globularis K. Presl, Epim. Bot. 30. 1849. TYPE: "Novae-Grenadae," *Linden* (PRC? not seen).

Cyathea equestris var. *boconensis* Karsten, *Linnaea* 28:456. 1857. TYPE: Páramo de Bocono, Sierra de Mérida, Edo. Trujillo, Venezuela, *Karsten* (LE? not seen),

Cyathea petiolulata Karsten, Fl. Columb. 2:163, t. 185. 1869. TYPE: Mérida, Edo. Mérida, Venezuela, 2000–2500 m, *Karsten* (LE? not seen).

Cyathea calva Karsten, Fl. Columb. 2:175, t. 192. 1869. TYPE: Near Escuque, Sierra de Mérida, Edo. Trujillo, Venezuela, 1000 m, *Karsten* (LE? not seen).

Cyathea firma Kuhn, *Linnaea* 36:163. 1869. TYPE: Mérida, Edo. Mérida, Venezuela, *Funck & Schlim 1228* (B not seen fragm US).

Alsophila subaspera Christ in Pitt. Prim. Fl. Costaric. 3(1):43. 1901. SYNTYPES: Forests of Copey, Pcia. S. José, *Tonduz 11787* (BR or P not seen; isosyntypes A, CR, GH, NY, US), *11802* (BR not seen photo 4943 fragm NY; isosyntypes B not seen, CR, P not seen), and *12183* (BR or P not seen; isosyntypes CR, NY).

Cyathea petiolulata var. *pastoensis* Hieron. Bot. Jahrb. Syst. 34:437. 1904. TYPE: Near Altaquer and S. Pablo, Cordillera de Pasto, Depto. Nariño, Colombia, 900–1400 m, *Lehmann 81* (B not seen).

Cyathea pelliculosa Christ, Bull. Herb. Boissier II, 4:946. 1904. SYNTYPES: Costa Rica, *Wercklé 45* (P not seen) and *50* (P not seen).

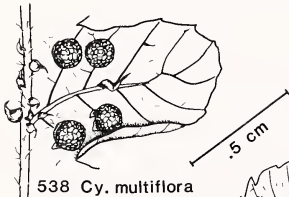
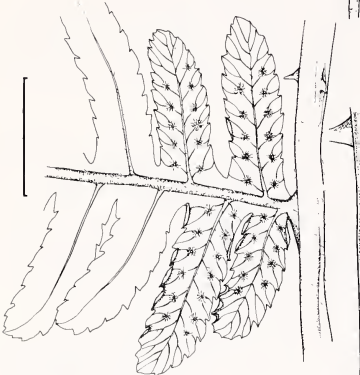
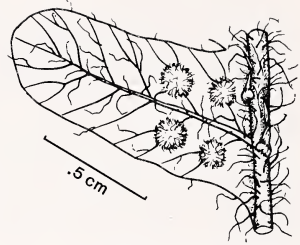
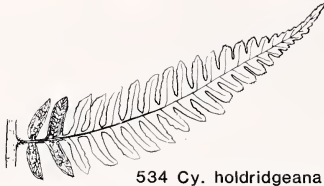
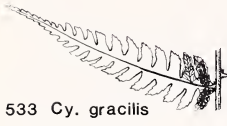
Alsophila latisecta Christ, Bull. Herb. Boissier II, 6:185. 1906. TYPE: Valley of the Río Navarro, Pcia. Cartago, *Wercklé 16767* (P not seen).

Cyathea divergens var. *minor* Rosenst. Repert. Spec. Nov. Regni Veg. 22:2. 1925. LECTOTYPE: La Palma, Pcia. S. José, 1400 m, *Brade & Brade 108* (S not seen; isolectotypes NY, UC), chosen by Tryon (Contr. Gray Herb. 206:54. 1976).

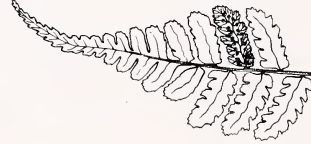
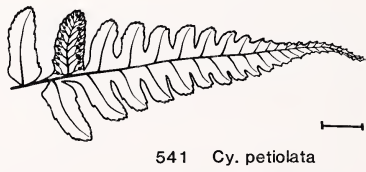
Cyathea divergens var. *hirta* Losch, Mitt. Bot. Staatssaml. München 1(1):20. 1950. TYPE: Chirripó Grande, Pcia. S. José, 2000 m, *Kupper 1265* (M not seen), synonymized by Tryon (Contr. Gray Herb. 206:55. 1976).

TYPE: Near Pampayacu, Depto. Huánuco, Peru, Jul 1869, *Poeppig Diar. 1163* (LZ destroyed).

Plants terrestrial, at (400)1200–2700(3200) m elevation, from Volcán Orosi (Pcia. Guanacaste), the Cordillera Central, the Fila de Cedral and Cerro Tablazo, the Cordillera de Talamanca to Pcia. Chiriquí, and the valley of the Río General. Also from Venezuela, Colombia to Peru, and Guyana.



.5 cm



Alsophila latisecta Christ is a 3-pinnate-pinnatifid form whose description matches a specimen collected above Purisil, Pcia. Cartago, not far from the type locality (*Lellinger 1537*, CR, US).

531. *Cyathea falcata* (Kuhn) Domin, Pteridophyta 262. 1929.

Alsophila falcata Kuhn, *Linnaea* 36:155. 1869. TYPE: Gorgona Island, Depto. Nariño, Colombia, *Seemann* (K not seen frags NY not seen US).

Nephrodium kuhnii Hieron. Bot. Jahrb. Syst. 34:440. 1904. TYPE: Cordillera de Pasto, Depto. Nariño, Colombia, 1000 m, *Lehmann 16* (K not seen; isotype US).

Plants epipetric, at 600 m elevation, in the Flora area known only from near Llano Grande, Pcia. Coclé (*Sytisma*, *Andersson & Brenner 4415*, MO). Also from Pacific coastal Colombia, although not yet recorded from the Chocó.

532. *Cyathea fulva* (Martens & Galeotti) Fée, Cat. Foug. Mex. [Mém. Foug. 9]:34. 1857.

Alsophila fulva Martens & Galeotti, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15:78, t. 23. 1842. TYPE: Talea, Cordillera Occidental, Edo. Oaxaca, Mexico, *Galeotti 6346* (BR not seen photos 4877, 4905 fragm US; isotype P not seen fragm UC).

Cyathea schlechtendalii Kunze, Bot. Zeitung (Berlin) 3:288. 1845. TYPE: Venezuela, *Schlechtendal* (LZ destroyed), synonymized by Tryon (Contr. Gray Herb. 206:66. 1976).

Cyathea aurea Klotzsch, Allg. Gartenzeitung 24:105. 1856. AUTHENTIC MATERIAL: Between Petaquire and Colonia Tovar, Venezuela, *Karsten 7* (B not seen fragm NY), synonymized by Tryon (Contr. Gray Herb. 206:66. 1976).

Cyathea aurea var. *squamosa* Karsten, *Linnaea* 28:459. 1857. TYPE: Between Petaquire and Colonia Tovar, Venezuela, *Karsten* (LE? not seen; isotype B not seen).

Cyathea furfuracea Christ, Bull. Herb. Boissier II, 4:950. 1904, non Baker, 1874, nom. illeg. TYPE: Costa Rica, *Wercklé* (P not seen; isotype NY fragm US).

Cyathea onusta Christ, Bull. Herb. Boissier II, 4:950. 1904. TYPE: Costa Rica, *Wercklé 41* (P not seen; isotype US).

Cyathea papyracea Christ, Bull. Herb. Boissier II, 4:946. 1904. LECTOTYPE: Costa Rica, *Wercklé 52*, second sheet (P not seen), chosen by Gastony (Contr. Gray Herb. 203:147. 1973).

Cyathea conspersa Christ, Bull. Herb. Boissier II, 5:260. 1905. TYPE: A renaming of *Cyathea furfuracea* Christ, and so based on the type of that name.

Cyathea underwoodii Christ, Bull. Herb. Boissier II, 6:183. 1906. SYNTYPES: Navarro, Pcia. Cartago, *Wercklé* in 1903 (P not seen; isosyntype NY), *Wercklé* in 1901–1905 (P not seen; isosyntypes NY, US), and *Wercklé* in 1905 (P not seen).

Cyathea delicatula Maxon, Contr. U. S. Natl. Herb. 13:4. 1909. TYPE: Between Tactic and Cobán, Depto. Alta Verapaz, Guatemala, *von Tuerckheim II 1629* (US; isotype GH not seen).

Cyathea mollis Rosenst. Repert. Spec. Nov. Regni Veg. 22:2. 1925, non Copel., 1917, nom. illeg. LECTOTYPE: La Palma, 1400 m, *Brade & Brade 631* (S not seen; isoelectotypes B, US fragm NY), chosen by Tryon (Contr. Gray Herb. 206:68. 1976).

FIGS. 533–543. *Cyathea*. FIG. 533. Median pinnule of upper pinna of *Cy. gracilis*, *Brade 853*. FIG. 534. Pinnule of *Cy. holdridgeana*, *Nisman 104*. FIG. 535. Apex of lateral pinna of *Cy. impar*, *Tyson, Dwyer & Blum 3264*. FIG. 536. Ultimate segment of *Cy. lockwoodiana*, *Stern et al. 528*. FIG. 537. Pinnule base of *Cy. microdonta*, *Killip 2540*. FIG. 538. Ultimate segment of *Cy. multiflora*, *Burger & Stolze 5876*. FIG. 539. Basal portion of median pinnule of *Cy. nigripes* var. *brunnescens*, *Lellinger & de la Sota 428*. FIG. 540. Basal portion of median pinna of *Cy. nigripes* var. *nigripes*, *Killip 35132*. FIG. 541. Apex of lateral pinna of *Cy. petiolata*, *Killip 2802*. FIG. 542. Pinna of *Cy. phalaenolepis*, *Killip 35347*. FIG. 543. Basal portion of median pinnule of *Cy. pilosissima*, *Lellinger & de la Sota 714*.

Cyathea molliuscula Domin, Acta Bot. Bohem. 9:138. 1930. TYPE: A renaming of *Cyathea mollis* Rosenst., and so based on the type of that name.

Plants terrestrial, at 700–3100 m elevation, in forests, from Monteverde, the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, La Mesa (Pcia. Coclé), Cerro Campana and Campo Tres (both Pcia. Panama), Cerro Pirre, and Alto del Buey. Also from Mexico, Guatemala, Honduras, Nicaragua, Venezuela, and Colombia.

533. *Cyathea gracilis* Griseb. Fl. Brit. W. Ind. 704. 1864.

TYPE: Fox's Gap, Jamaica, *Purdie* (K not seen; isotype BM not seen).

Plants terrestrial, at 1000–1500 m elevation, in forests, from La Palma and vicinity and the Finca Haberle near Cerro Tablazo. Also from Jamaica and Colombia.

534. *Cyathea holdridgeana* Nisman & Gómez, Amer. Fern J. 61:168, t. 26. 1971.

TYPE: La Chonta, at Km. 55 of the Interamerican Highway, Pcia. Cartago, 2200 m, *Nisman S. 104* (CR; isotypes F not seen, GH not seen).

Plants terrestrial, at 2200 m elevation, in the Flora area known only from the central northeastern slopes of the Cordillera de Talamanca.

This species is thought by Tryon (Contr. Gray Herb. 206:90. 1976) to be a hybrid between *C. divergens* and *C. stipularis*.

535. *Cyathea impar* Tryon, Contr. Gray Herb. 206:42, f. 59, 60. 1976.

TYPE: Northeast slope of Cerro Jefe, on the road to Buenos Aires, Pcia. Panama, 2600 ft, *Tyson, Dwyer & Blum 3264* (MO).

Plants terrestrial, at 700–800 m elevation, in forests, from Cerro Jefe, the Sta. Rita ridge road (Pcia. Colón), and north of Cerro Mali (Pcia. Darién).

536. *Cyathea lockwoodiana* (Windisch) Lellinger, Amer. Fern J. 74:57. 1984.

Sphaeropteris lockwoodiana Windisch, Bradea 2:57. 1976. TYPE: Cerro Chiribiquete, Río Macaya (tributary of the Río Apaporis), Comis. Vaupés, Colombia, *Schultes & Cabrera 5635* (GH not seen; isotype US).

Plants terrestrial, at 0–800 m elevation, in forests, from Las Cascadas (Canal Zone), the Río La Maestra (Pcia. Panama), the vicinity of Cana, and Mamey (Pcia. Darién). Also from Venezuela and Colombia.

537. *Cyathea microdonta* (Desv.) Domin, Pteridophyta 263. 1929.

Polypodium microdontum Desv. Ges. Naturf. Freunde Berlin Mag. 5:319. 1811. TYPE: "Am. calidiore," collector unknown (P not seen photo 3427).

Polypodium aculeatum Raddi, Opusc. Sci. 3:288. 1819; Pl. Bras. Nov. Gen. 1:27, t. 42. 1825, non L., 1753, nom. illeg. TYPE: Rio de Janeiro, Est. Rio de Janeiro, Brazil, *Raddi* (FI not seen).

Alsophila armata Mart. Icon. Pl. Crypt. Bras. 72, t. 28, 48. 1834. TYPE: A renaming of *P. aculeatum* Raddi, and so based on the type of that name.

Alsophila ferox K. Presl, Tent. Pterid. 62. 1836. TYPE: A renaming of *P. aculeatum* Raddi, and so based on the type of that name.

Plants terrestrial, at 0–1100 m elevation, in forests, from the foothills of the Cordillera Central and the Atlantic coastal plain of Costa Rica and Panama, the valley of the Río General, Chorrera (Pcia. Panama), the Canal Zone, and the

central Chocó. Also from Cuba, Jamaica, Hispaniola, Trinidad, Mexico to Nicaragua, Colombia, Peru, Brazil, and the Guianas.

538. *Cyathea multiflora* J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:416. 1793.

Hemitelia nigricans K. Presl, Abh. Königl. Böhm. Ges. Wiss. V, 6:391 (repr. 31). 1851, non *Cyathea nigricans* Mett., 1863. TYPE: Río S. Juan, Guatemala, *Friedrichsthal* (W not seen frags NY, US).

Hemitelia atrovirens Trevis. Atti Ist. Veneto II, 2:164. 1851. TYPE: Río S. Juan, Guatemala, *Friedrichsthal* 639 (FI? not seen).

Hemitelia obscura Mett. in Tr. & Planch. Ann. Sci. Nat. Bot. V, 2:264. 1864, non *Cyathea obscura* (Bedd.) Copel., 1909. TYPE: "Prov. de Barbacoas, via de Tuquerres," Depto. Nariño, Colombia, 1600 m, *Triana* 189 (B not seen fragm NY; isotypes K not seen fragm NY, P not seen).

Hemitelia denticulata Hook. Syn. Fil. 31. 1865. TYPE: Presumably Panama, *Cuming* 1360 (K not seen), according to Tryon (Contr. Gray Herb. 206:32. 1976).

Hemitelia lindigii Baker, Syn. Fil. ed. 2. 454. 1874. TYPE: Alto del Trigo, Depto. Cundinamarca, Colombia, *Lindig* 310 (K not seen fragm US; isotype P not seen).

Hemitelia hartii Baker, J. Bot. Brit. For. 24:243. 1886. TYPE: Chiriquí Lagoon, Pcia. Bocas del Toro, *Hart* 43 (K not seen; isotypes NY not seen, P not seen, US).

Alsophila leucolepis var. *pubescens* Christ, Prim. Fl. Costaric. 3(1):42. 1901. SYNTYPES: Cañas Gordas, Pcia. Puntarenas, *Pittier* 10981 (BR or P not seen; isosyntype US), *Pittier* 10982 (BR or P not seen); and *Pittier* 10992 (P not seen; isosyntype US).

Alsophila decussata Christ in Pitt. Prim. Fl. Costaric. 3(1):41. 1901. TYPE: El General, Diquis basin, Pcia. Puntarenas, 600 m, *Pittier* 12027 (BR not seen photo 4903; isotypes CR, NY, P not seen, US).

Alsophila pinnula Christ in Pitt. Prim. Fl. Costaric. 3(1):43. 1901. TYPE: Not stated, but presumably Marais de la Río Matina, Pcia. Limón, 20 m, *Pittier* 10267 (P not seen photo 3438; isotype US), according to Barrington (Contr. Gray Herb. 208:81. 1978).

Hemitelia squarrosa Rosenst. Repert. Spec. Nov. Regni Veg. 22:2. 1925. TYPE: Finca Hundriesser, Pcia. Limón, *Brade & Brade* 405 (*Ros. Fil. Costaric. Exs.* 195) (S not seen; isotypes B not seen, UC, US fragm NY).

Cyathea austroamericana Domin, Pteridophyta 263. 1929. TYPE: A renaming of *H. nigricans* K. Presl, and so based on the type of that name.

Cyathea columbiana Domin, Pteridophyta 263. 1929. TYPE: A renaming of *Hemitelia obscura* Mett., and so based on the type of that name.

Hemitelia squamulosa Losch, Mitt. Bot. Staatssaml. München 1:20. 1950. TYPE: Orosi, Pcia. Cartago, 1100 m, *Kupper* 798 (M not seen photo BM not seen), synonymized by Tryon (Contr. Gray Herb. 206:32. 1976).

Cyathea leucolepismata Alston, J. Wash. Acad. Sci. 48:231. 1958. TYPE: Near S. Diego de Colorado, between Umbria and Puerto Asis, Depto. Putumayo, Colombia, *Ewan* 16748 (BM not seen; isotypes UC, US).

TYPE: Tropical America, *Shakespeare* (BM not seen Tryon photo frags NY, US).

Plants terrestrial, at 0–1600 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, S. Isidro del General, the Atlantic and Pacific lowlands from Costa Rica to the Canal Zone, the mountains of Pcias. Veraguas and Coclé, and the Andean slopes of the Depto. Chocó. Also from Guatemala to Honduras, Nicaragua, Colombia to Bolivia, and Brazil.

This species is extremely variable in frond form, with differences in the ultimate segments and even in the indument, which doubtless accounts for the large number of nomenclatural synonyms.

539. *Cyathea nigripes* var. *brunnescens* (Barr.) Lellinger, Amer. Fern J. 77:101. 1988.

Trichopteris nigripes var. *brunnescens* Barr. Rhodora 78:4, f. 5–6. 1976. TYPE: Río Yurumanguí, Depto. El Valle, Colombia, 5–50 m, *Cuatrecasas* 16155-C (US; isotype GH).

Plants terrestrial, at 0–300(1400) m elevation, from the Serranía del Darién, the summit of Cerro Pirre, Alto del Buey, and the Río S. Juan basin. Also from Colombia, Ecuador, and Peru.

540. *Cyathea nigripes* (C. Chr.) Domin, Pteridophyta 263. 1929, var. *nigripes*.

Alsophila melanopus Hook. Syn. Fil. 37. 1865, non Hassk., 1855, nom. illeg. LECTOTYPE: Mt. Chimborazo, Pcia. Chimborazo, Ecuador, 3000 ft, *Spruce* 5742 (K not seen), chosen by Barrington (Contr. Gray Herb. 208:41. 1978).

Alsophila nigripes C. Chr. Ind. Fil. 45. 1905. TYPE: A renaming of *A. melanopus* Hook., and so based on the type of that name.

Plants terrestrial, at 0–1500 m elevation, from north of S. Ramón, the Cordillera Central, the Cordillera de Talamanca to S. Isidro del General, near El Valle, Cerro Pirre and the Cerro de Garagará (Pcia. Darién), the central Chocó, and the basin of the Río S. Juan. Also from Colombia and Ecuador.

541. *Cyathea petiolata* (Hook.) Tryon, Contr. Gray Herb. 206:42. 1976.

Hemitelia petiolata Hook. Sp. Fil. 1:31, t. 16. 1844. TYPE: "Isthmus of Panama," *Sinclair* (K not seen).

Hemistegia marginalis K. Presl, Gefässbündel Farrn 47 (postpr. 355). 1847, nom. superfl. TYPE: A renaming of *Hemitelia petiolata* Hooker, and so based on the type of that name.

Cyathea panamensis Domin, Pteridophyta 264. 1929, nom. superfl. TYPE: A renaming of *Hemitelia petiolata* Hook., and so based on the type of that name.

Hemitelia woronovii Maxon & Morton, Amer. Fern J. 36:91. 1946. TYPE: Peñas Blancas, Depto. Antioquia, Colombia, *Woronow & Juzepczuk* 4549 (LE not seen; isotype US).

Plants terrestrial, at 0–200(600) m elevation, in forests, from the Canal Zone through the Chocó. Also from the Pacific coastal slopes of Colombia south of the Chocó.

542. *Cyathea phalaenolepis* (C. Chr.) Domin, Pteridophyta 263. 1929.

Alsophila phalaenolepis C. Chr. Repert. Spec. Nov. Regni Veg. 10:213. 1911. TYPE: Pcia. Esmeraldas, Ecuador, Aug 1904, *Sodiolo* (P not seen photo 3437).

Plants terrestrial, at 0–300 m elevation, in forests, from the southern half of the Chocó. Also from adjacent Colombia and Ecuador.

543. *Cyathea pilosissima* (Baker) Domin, Pteridophyta 262. 1929.

Alsophila pilosissima Baker, Syn. Fil. ed. 2. 457. 1874. TYPE: Mount Campana, Tarapoto, Depto. S. Martín, Peru, *Spruce* 4322 (K not seen Tryon photo fragms NY, US).

Plants terrestrial, at 0–200(1000) m elevation, from Cerro Pirre and the Alturas de Roque (Pcia. Darién), near Puerto Obaldía (Com. S. Blas), Acandí, Loma del Cuchillo, the Río Truando, Bahía Solano, and Puerto Utria (all Depto. Chocó). Also from Ecuador and Peru.

544. *Cyathea poeppigii* (Hook.) Domin, Pteridophyta 263. 1929.

Alsophila poeppigii Hook. Sp. Fil. 1:43. 1844. TYPE: Peru, *Poeppig* in 1829 (K not seen; isotype fragm US).

Alsophila elongata Hook. Sp. Fil. 1:43. 1844. TYPE: Colombia, *Hartweg* 1528 (K not seen; isotype fragms NY, US).

Alsophila sprucei Hook. Syn. Fil. 37. 1865, non *Cyathea sprucei* Hook., 1865. TYPE: Chimborazo, Pcia. Chimborazo, Ecuador, 2500 ft, *Spruce 5740* (K not seen; isotype P not seen).

Alsophila impressa Fée, Crypt. Vasc. Brésil 1:165, t. 58, f. 1. 1869. TYPE: Brazil, *Glaziou 983* (P not seen).

Alsophila tijucensis Fée, Crypt. Vasc. Brésil 1:171, t. 63, f. 1. 1869. LECTOTYPE: Tijuca, Est. Rio de Janeiro, Brazil, *Glaziou 1707* (P not seen fragm NY), chosen by Windisch (Bot. Jahrb. 98:189. 1977).

Alsophila bakeri Sodiro, Anales Univ. Quito 12:134 (repr. 532). 1895, nom. illeg., non Zeiler, 1885. TYPE: Near Sardinas, Valle de Pallatanga, Pcia. Chimbrazo, Ecuador, 1040 m, *Sodiro* (Hb. Sodiro not seen; isotype NY).

Alsophila quitensis C. Chr. Ind. Fil. 47. 1905. TYPE: A renaming of *A. bakeri* Sodiro, and so based on the type of that name.

Alsophila coriacea Rosenst. Mém. Soc. Sci. Nat. Neuchâtel 5:50, t. 2, f. 1. 1912. TYPE: Between Valparaíso and Supía, Depto. Antioquia–Caldas, Colombia, 1500 m, *Mayor 86* (S not seen; isotype fragm P not seen, isotype UC).

Cyathea oreites Domin, Pteridophyta 263. 1929. TYPE: A renaming of *Alsophila sprucei* Hook., and so based on the type of that name.

Cyathea anacampta Alston, J. Wash. Acad. Sci. 48:230. 1958. TYPE: Confluence of the Río Ticuanayoy and the Río Caquetá, Depto. Putumayo, Colombia, 1100 m, *Ewan 16081* (BM not seen; isotype US).

Plants terrestrial, at 0–1300 m elevation, in forests, from the Atlantic coastal plain of Costa Rica and Panama, the Cordillera Central, the Peninsula de Osa, the southern Pacific coastal plain of Costa Rica and adjacent Panama, and El Valle. Also from Venezuela and Colombia to Bolivia and Brazil.

545. *Cyathea pseudonanna* (Gómez) Lellinger, Proc. Biol. Soc. Wash. 98:376. 1985.

Trichopteris pseudonanna Gómez, Phytologia 50:69. 1981. TYPE: Cerro Tuti, Edo. Veraguas, Panama, *Folsom & Edwards 3370* (MO).

Plants terrestrial, at 900–1300 m elevation, known only from the type locality.

This species appears to be most closely related to *C. decorata*.

546. *Cyathea schiedeana* (K. Presl) Domin, Pteridophyta 263. 1929.

Alsophila schiedeana K. Presl, Tent. Pterid. 62. 1836. TYPE: Based ultimately on Between Huitamalco and Cuapa, Mexico, *Schiede* (B or HAL not seen).

Alsophila chnoodes Christ, Bull. Herb. Boissier II, 4:958. 1904. TYPE: Costa Rica, *Wercklé* (P not seen photo 3395; isotypes NY, US).

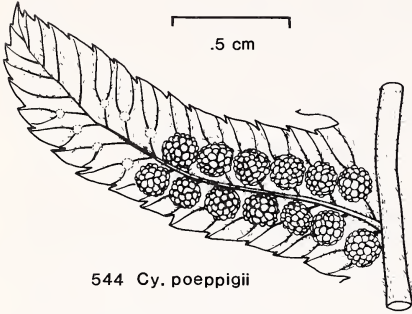
Alsophila crassifolia Wercklé ex Christ, Bull. Herb. Boissier II, 6:184. 1906. TYPE: Luna, Quebrada Pulanca, Costa Rica, *Wercklé* (P not seen; isotype US).

Plants terrestrial, at (0)600–1400 m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca and its eastern foothills to Pcia. Chirquí, the Fila Costeña near S. Vito, the vicinity of Chiriquí Lagoon (Pcia. Bocas del Toro), Cerro Tute (Pcia. Veraguas), Cerro Pilon (Pcia. Coclé), and the Río Guanche near the Portobelo Road (Pcia. Colon). Also from Mexico to El Salvador.

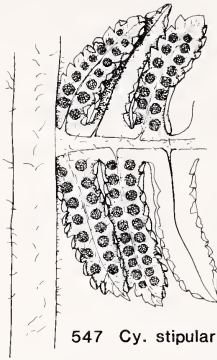
547. *Cyathea stipularis* (Christ) Domin, Pteridophyta 263. 1929.

Alsophila stipularis Christ, Bull. Herb. Boissier II, 4:958. 1904. TYPE: Costa Rica, *Wercklé* (BR or P not seen; isotypes GH, US).

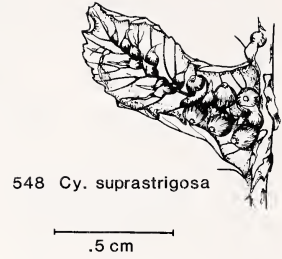
Cyathea aphlebioides Christ, Bull. Herb. Boissier II, 6:179. 1906. TYPE: Navarro, Pcia. Cartago, 1400 m, *Wercklé* (P not seen; isotype US).



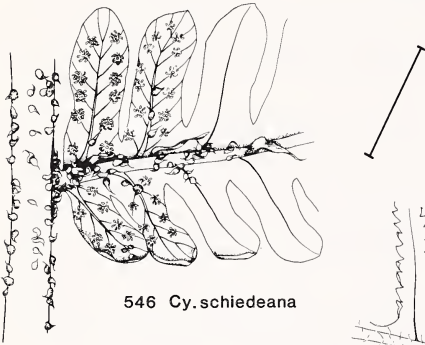
544 *Cy. poeppigii*



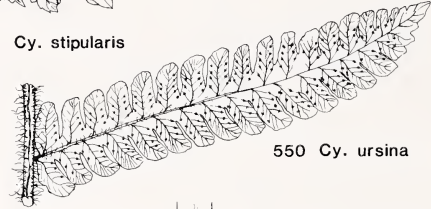
547 *Cy. stipularis*



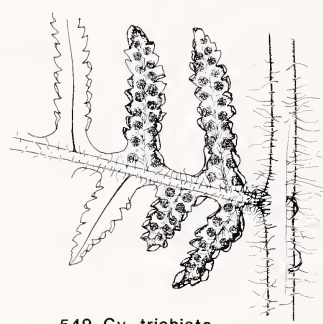
548 *Cy. suprastrigosa*



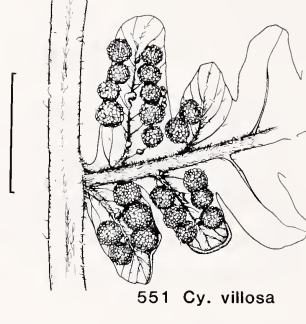
546 *Cy. schiedeana*



550 *Cy. ursina*



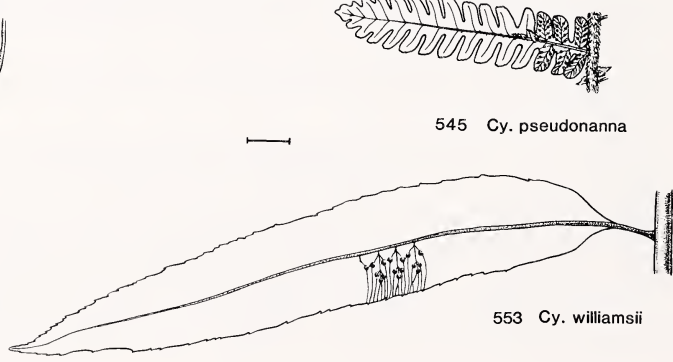
549 *Cy. trichiata*



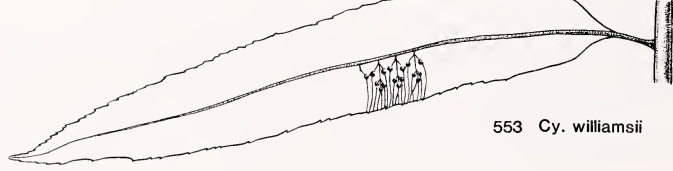
551 *Cy. villosa*



552 *Cy. wendlandii*



545 *Cy. pseudonanna*



553 *Cy. williamsii*

Alsophila ichthyolepis Christ, Bull. Herb. Boissier II, 6:186. 1906, as "*ichthyolepis*." LECTOTYPE: La Palma, Pcia. S. José, 1459 m, *Tonduz* 12527 (P not seen photo 3458; islectotypes GH, NY, US), chosen by Lellinger (Proc. Biol. Soc. Wash. 98:366. 1985).

Alsophila ochroleuca Christ, Bull. Soc. Bot. Genève II, 1:232. 1909. TYPE: La Palma, Pcia. S. José, *Wercklé* 17055 (P not seen; isotype BR not seen Tryon photo).

Plants terrestrial, at 1100–1700(2400) m elevation, in forests, from the Cordillera Central, the Cordillera de Talamanca to Pcia. Chiriquí, and the Fila Costeña near S. Vito. Also from Nicaragua.

547a. *Cyathea stolzei* A. R. Smith ex Lellinger, Amer. Fern J. 77:101. 1988.

Trichopteris pinnata Stolze, Amer. Fern J. 74:103, f. 2. 1984, non *Cyathea pinnata* Roxb. ex Clarke, 1874. TYPE: Sta. Rita Ridge road 21–26 km from the Transisthmian Hwy., Pcia. Colón, 500–550 m, *Knapp* 5881 (MO not seen; isotype F).

TYPE: A renaming of *Trichopteris pinnata* Stolze, and so based on the type of that name.

Plants terrestrial, at 0–500 m elevation, from west of Pto. Viejo (Pcia. Heredia), the Sta. Rita ridge road (Pcia. Colón), Cerro Azul (Pcia. Panama), Cerro Jefe, between the continental divide and the Atlantic ocean opposite Cartí (Com. S. Blas), and between El Valle and Bahía Solano (Depto. Chocó).

Smith and Grayum (Amer. Fern J. 78:105–108. 1988) reported hybrids between this species and *C. ursina* from Cerro Sardinal northeast of Volcán Barba (*Smith et al.* 1780, CR, MO, UC).

548. *Cyathea suprastrigosa* (Christ in Pitt.) Maxon, North Amer. Fl. 16:83. 1909.

Hemitelia suprastrigosa Christ in Pitt. Prim. Fl. Costaric. 3(1):44. 1901. TYPE: "Forêts de l'Achiote," Volcán Poás, Pcia. Alajuela, 2000 m, *Tonduz* 10701 (BR or P not seen; isotypes CR, NY, P not seen, US).

Cyathea conspicua Christ, Bull. Herb. Boissier II, 6:178. 1906. TYPE: Volcán Turrialba, Pcia. Cartago, *Wercklé* in 1905 (P not seen; isotypes US fragm NY).

Plants terrestrial, at 1400–3000 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Cerro Chirripó.

549. *Cyathea trichiata* (Maxon) Domin, Acta Bot. Bohem. 9:166. 1930.

Alsophila trichiata Maxon, Contr. U. S. Natl. Herb. 24:44, t. 15. 1922. TYPE: Near Cana, Pcia. Darién, 660 m, *R. S. Williams* 928 (US; isotype NY? not seen).

Plants terrestrial, at 0–1400(1600) m elevation, in forests, from the Cordillera Central and the north end of the Cordillera de Talamanca and their adjoining lowlands, the Fila Costeña, the Peninsula de Osa, and the lowlands of Panama to the central Chocó. Also from Nicaragua, Venezuela, Colombia, and Ecuador.

550. *Cyathea ursina* (Maxon) Lellinger, Amer. Fern J. 77:101. 1988.

Alsophila ursina Maxon, J. Wash. Acad. Sci. 34:48. 1944. TYPE: Antelope Ridge, Stann Creek Valley, Stann Creek Distr., Belize, *Gentle* 3197 (US; isotype MICH not seen).

FIGS. 544–553. *Cyathea*. FIG. 544. Ultimate segment of *Cy. poeppigii*, Skutch 17. FIG. 545. Pinna of *Cy. pseudonanna*, Folsom & Edwards 3370 (MO). FIG. 546. Pinnule base of *Cy. schiedeana*, de la Sota 5182. FIG. 547. Pinnule base of *Cy. stipularis*, Tonduz 12527. FIG. 548. Ultimate segment of *Cy. suprastrigosa*, Pittier 4175. FIG. 549. Pinnule base of *Cy. trichiata*, R. S. Williams 928. FIG. 550. Median pinna of *Cy. ursina*, Scamman 7438. FIG. 551. Pinnule base of *Cy. villosa*, Killip & Smith 15309, Colombia. FIG. 552. Basal portion of median pinnule of *Cy. wendlandii*, Allen 2783. FIG. 553. Median pinna of *Cy. williamsii*, R. S. Williams 850.

Plants terrestrial, at 100–300 m elevation, from Cerro Sardinal, Timbirina, and Finca La Selva (all Pcia. Heredia). Also from Belize and Nicaragua.

For a comment on hybrids with *C. stolzei*, see that species.

551. *Cyathea villosa* Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:495. 1810.

Chnoöphora humboldtii Kaulf. Enum. Fil. 250. 1824, nom. illeg. TYPE: A renaming of *C. villosa* Humb. & Bonpl. ex Willd., and so based on the type of that name.

Alsophila rigidula Mart. Icon. Pl. Crypt. Bras. 74, t. 51. 1834. TYPE: Est. S. Paulo, Brazil, *Martius* (M not seen).

Alsophila vernicosa Mett. ex Kuhn, Linnaea 36:155. 1869. TYPE: Venezuela, *Fendler* 344 (B not seen fragm NY not seen; isotypes GH not seen, MO not seen, US).

Alsophila villosa var. *dusenii* Christ in Dusén, Ark. Bot. 9(15):2. 1910. SYNTYPES: Serrinha, Est. Paraná, Brazil, *Dusén* 3437 (S not seen; isotype US); and Rio Guavirova, Est. Paraná, Brazil, *Dusén* 8049 (S not seen).

Alsophila cipoensis Sehnem, Fl. Illustr. Catar. 1(CIAT):96, t. 39. 1978. TYPE: Serra do Cipó, Jaboticatuba, Est. Minas Gerais, Brazil, *Hatschbach* 29880 (ASSL not seen; isotype UC).

LECTOTYPE: Sta. Cruz, Edo. Sucre, Venezuela, *Humboldt* 436 (B-Hb. Willd. 20175-2 not seen Tryon photo), inferentially chosen by Barrington (Contr. Gray Herb. 208:60. 1978).

Plants terrestrial, at 300–800 m elevation, in forests, from Buenos Aires (Pcia. Puntarenas), and S. Felix to Cerro Flor (Pcia. Chiriquí). Also from Venezuela, Colombia, and Brazil.

552. *Cyathea wendlandii* (Mett. ex Kuhn) Domin, Pteridophyta 263. 1929.

Alsophila wendlandii Mett. ex Kuhn, Linnaea 36:158. 1869, as “*wendlandi*.” TYPE: San Miguel, Costa Rica, *Wendland* 761 (B not seen fragm US).

Alsophila latisecta Christ, Bull. Herb. Boissier II, 6:185. 1906. TYPE: Valley of the Río Navarro, Pcia. Cartago, 1400 m, *Wercklé* 16767 (P not seen fragm NY; isotype US).

Plants terrestrial, at 500–1500 m elevation, in forests, from La Marina (Pcia. Alajuela), west of Sta. Fé, north of El Valle, and near Cerro Jefe.

553. *Cyathea williamsii* (Maxon) Domin, Acta Bot. Boehm. 9:171. 1930.

Alsophila williamsii Maxon, Contr. U. S. Natl. Herb. 24:46, t. 17. 1922. TYPE: Mountains above Cana, Pcia. Darién, 1800 m, *R. S. Williams* 850 (US; isotype NY).

Plants terrestrial, at 800–1800 m elevation, in forests, from Sta. Fé, near Sta. Rita (Pcia. Colón), Cerro Jefe, the El Llano–Carti road (Com. S. Blas), Cerro Pirre and above Cana, and the slopes of Alto del Buey. Also from Venezuela.

65. ALSOPHILA R. Br.

Plants terrestrial, arborescent; caudices usually erect (prostrate or decumbent in some species), woody, often with a thick covering of adventitious roots, especially at the base of erect rhizomes, scaly; stipes stout, obsolete to long, smooth to spiny, scaly, the scales concolorous to bicolorous, with usually black marginal spine-like cells and/or an apical cell, the marginal cells different in shape and orientation from the central ones; laminae pinnate-pinnatifid to 3-pinnate-pinnatifid, chartaceous to subcoriaceous; veins simple or more commonly forked; sori lateral on the veins, usually borne close to the costa, round, exindusiate or indusiate (the indusia various), sometimes paraphysate; sporangia short-stalked, bearing 16 spores.

Pantropical; over 200 species, with ca. 30 plus hybrids in the New World.

CONANT, D. S. 1983. A revision of the genus *Alsophila* (Cyatheaceae) in the Americas. *J. Arnold Arbor.* 64:333–382.

GASTONY, G. J. 1973. A revision of the fern genus *Nephelea*. *Contr. Gray Herb.* 203:81–148.

1. Indusia whitish to tan, thin and delicate, deciduous to persistent, rupturing irregularly..3.

1. Indusia dark brown, thick and firm, persistent, rupturing to 2–4 lobes..2.

2(1). Costae not alate between the more distal, sessile pinnules, usually pale brown abaxially; pinnule segments of median pinnae mostly 3–4 mm wide; indusia cup- to urn-shaped or rarely spherical with an apical pore.

555. *A. erinacea* var. *erinacea*

2(1). Costae alate between the more distal, sessile pinnules, usually atropurpureous abaxially; pinnule segments of median pinnae mostly 2–3 mm wide; indusia urn-shaped (rarely cup-shaped or spherical without an apical pore).

554. *A. cuspidata*

3(1). Scales on the costae and costules bicolorous, the central band atropurpureous, terminating in an apical spine-like cell, the margins pale; costae not alate between the more distal, sessile pinnules.

557. *A. imrayana* var. *basilaris*

3(1). Scales of the costae and costules concolorous, pale to brownish, bearing 1–several pale to dark brown, marginal spine-like cells; costae alate between the more distal, sessile pinnules..4.

4(3). Laminae uniformly 2-pinnate-pinnatifid; pinnules up to 2.5 cm wide; ala of the costae ca. 0.25–0.5 mm wide.

556. *A. firma*

4(3). Laminae 2-pinnate-pinnatifid to 3-pinnate-pinnatifid; pinnules up to 4.5 cm wide; ala of the costae ca. 0.4–0.7 mm wide.

558. *A. polystichoides*

554. *Alsophila cuspidata* (Kunze) Conant, *J. Arnold Arbor.* 64:371. 1983.

Cyathea cuspidata Kunze, *Linnaea* 9:101. 1834. TYPE: “Prov. Maynas,” Peru, *Poeppig Diar.* 2286 (LZ destroyed; isotypes B not seen, NY not seen, P not seen, fragm US).

Cyathea oyapoka Jenm. *Ferns Brit. W. Ind. Guiana* 58. 1898. TYPE: Upper Oyapok river, French Guiana, June 1883, *Leprieur* (NY; isotypes F, GH, NY, P none seen, US).

Cyathea punctifera Christ in Pitt. *Prim. Fl. Costaric.* 3(1):40. 1901. TYPE: Tuís, Pcia. Cartago, 650 m, *Tonduz 11307* (BR not seen; isotypes GH, fragm NY, P not seen, US).

Cyathea hassleriana Christ, *Bull. Herb. Boiss.* II, 7:926. 1907. TYPE: Near Caacupe, La Cordillera, Paraguay, *Hassler 120* (P? not seen; isotype S not seen).

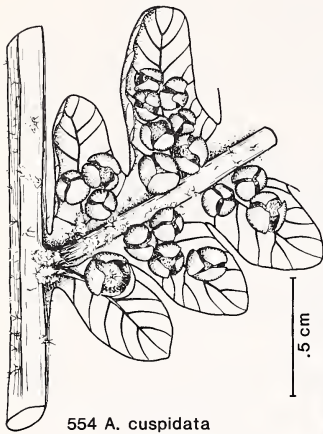
Plants terrestrial, at 0–1100(1800) m elevation, in forests, in the foothills of the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí, Cerro Pilon (Pcia. Coclé), the Canal Zone, El Llano–Carti road (Pcia. Panama), between Paya and Boca de Paya (Pcia. Darién), and the southern Chocó. Also from Nicaragua, Colombia to Bolivia, French Guiana, Brazil, and Paraguay.

555. *Alsophila erinacea* (Karst.) Conant, *J. Arnold Arbor.* 64:371. 1983, var. *erinacea*.

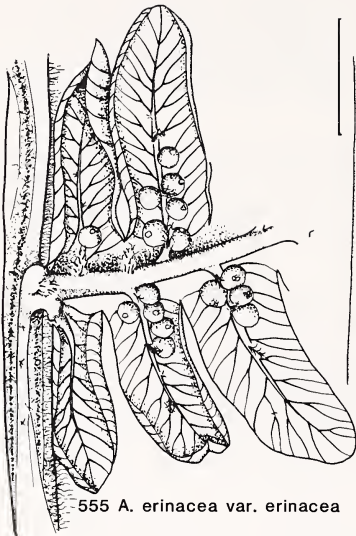
Cyathea erinacea Karst. *Linnaea* 28:453. 1857. TYPE: Mérida, Edo. Mérida, Venezuela, 2000 m, *Karsten* (W or LE not seen; isotype B not seen).

Cyathea aureonitens Christ, *Bull. Herb. Boiss.* II, 4:948. 1904. LECTOTYPE: Río Navarrito, Pcia. Cartago, 1400 m, *Pittier 2413* (BR not seen; isoelectotypes NY not seen, B not seen, P not seen), chosen by Gastony (*Contr. Gray Herb.* 203:121. 1973).

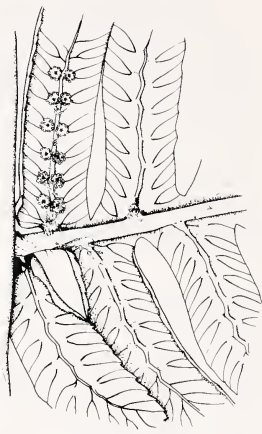
Cyathea cuspidata var. *rigida* Rosenst. *Meded. Rijks-Herb.* 19:6. 1913. TYPE: Espiritu Santo, Depto. Cochabamba, Bolivia, 1600 m, *Herzog 2237* (L not seen fragm US; isotypes M not seen, S not seen, UC not seen, US).



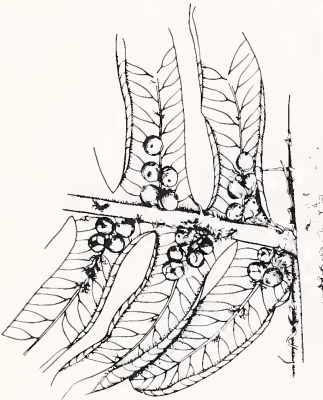
554 *A. cuspidata*



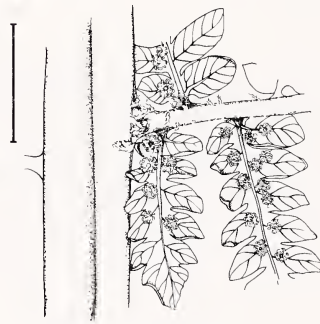
555 *A. erinacea* var. *erinacea*



556 *A. firma*



557 *A. imrayana* var. *basilaris*



558 *A. polystichoides*



559 *S. brunei*



560 *D. gigantea*



561 *D. karsteniana*



562 *C. conifolia*

Plants terrestrial, at (100)800–2000 m elevation, in forests, from the Cordillera de Tilarán, the Cordillera Central, and the Cordillera de Talamanca to Pcia. Chiriquí, La Mesa (Pcia. Coclé), and the Río S. Juan between Dipurdu and S. Miguel (Depto. Chocó). Also from Venezuela and Colombia to Bolivia.

556. *Alsophila firma* (Baker) Conant, J. Arnold Arbor. 64:372. 1983.

Cyathea mexicana Schlechtend. & Cham. Linnaea 5:616. 1830, non *Alsophila mexicana* Mart., 1834. TYPE: Jalapa, Edo. Veracruz, Mexico, *Schiede* (B not seen; isotypes BM, K neither seen).

Cyathea articulata Fée, Mém. Soc. Sci. Hist. Nat. Strasbourg 5 [Mém. Foug. 8]: 111. 1857, non *Alsophila articulata* J. Smith ex T. Moore & Houlst., 1852. TYPE: Villa Alta and Talea, Edo. Oaxaca, Mexico, *Galeotti 6531* (BR not seen; isotypes B not seen fragm NY, P not seen, US).

Hemitelia firma Baker, J. Bot. Brit. For. 15:161. 1877, non *Cyathea firma* Mett. ex Kuhn, 1869. TYPE: Andes of Quito, Pcia. Pichincha, Ecuador, Aug 1875, *Sodiño* (K not seen; isotypes P not seen, US).

Cyathea patellaris Christ, Annuaire Conserv. Jard. Bot. Genève 4:207. 1900. TYPE: Río de Las Vueltas, Tucurrique, Pcia. Cartago, 631 m, *Tonduz 12783* (G not seen photos 16879–16882; isotypes F not seen, GH, M not seen, NY, P not seen, US).

Alsophila costalis Christ, Bull. Herb. Boissier II, 4:951. 1904. TYPE: Near Turrialba[?], Pcia. Cartago, *Wercklé & Brune* (P not seen; isotype fragm NY).

Alsophila furcata Christ, Bull. Herb. Boissier II, 4:957. 1904. TYPE: Azul Quelle, Turrialba, Pcia. Cartago, *Wercklé & Brune* (P not seen; probably isotype US).

Alsophila tenerifrons Christ, Bull. Herb. Boissier II, 4:959. 1904. TYPE: Jiménez, Pcia. Limón, 200 m, *Alfaro 16509* (P not seen USNH photo 3150 fragm NY; isotypes GH not seen, P not seen, fragm US).

Cyathea trejoi Christ, Bull. Herb. Boissier II, 5:733. 1905. TYPE: S. Pablo, Edo. Chiapas, Mexico, 1500 m, *Muench* in 1903 (P not seen fragm NY), synonymized by Tryon (Contr. Gray Herb. 206:92. 1976).

Cyathea arida Christ, Bull. Herb. Boissier II, 6:180. 1906. SYNTYPES: Navarro, La Luna, Pcia. Cartago, 1400 m, *Wercklé 16757* (P not seen; isosyntype US) and *16780* (P? not seen); and Alto de Mano de Tigre, Diquis, Pcia. Puntarenas, 700 m, *Pittier 12097* (P? not seen; isosyntype US).

Cyathea gemmifera Christ in Jiménez, Bol. Fomento (San José) 3:664, f. 1–6. 1913. TYPE: Cerros del Tremedal near S. Ramón, Pcia. Heredia, 1300–1400 m, *Tonduz (Hb. Jiménez 913) 17563* (CR not seen; isotypes A, F not seen, P not seen, UC, US).

Cyathea firmula Domin, Acta Bot. Boehm. 9:115. 1930. TYPE: A renaming of *Hemitelia firma* Baker, and so based on the type of that name.

Plants terrestrial, at 0–1700 m elevation, in forests, from the slopes of the Cordilleras and adjacent ridges and wet lowlands throughout the Flora area. Also from Mexico to Nicaragua and Ecuador.

557. *Alsophila imrayana* var. *basilaris* (Christ) Lellinger, Amer. Fern J. 75:31. 1985.

Cyathea basilaris Christ, Bull. Herb. Boissier II, 4:949. 1904. LECTOTYPE: Costa Rica, *Wercklé* (P not seen; isotypes NY, US), chosen by Gastony (Contr. Gray Herb. 203:127. 1973).

FIGS. 554–562. *Alsophila*, *Sphaeropteris*, *Dicksonia*, and *Culcita*. FIG. 554. Pinnule base of *A. cuspidata*, Idrobo & Schultes 922, Colombia. FIG. 555. Pinnule base of *A. erinacea* var. *erinacea*, Wercklé 584. FIG. 556. Pinnule base of *A. firma*, Killip 2692. FIG. 557. Pinnule base of *A. imrayana* var. *basilaris*, Grant 10879, Colombia. FIG. 558. Pinnule base of *A. polystichoides*, Tonduz 12528. FIG. 559. Ultimate segment of *S. brunei*, Maxon 332. FIG. 560. Base of median pinnule of median pinna of *D. gigantea*, Standley & Torres 51059. FIG. 561. Base of median pinnule of median pinna of *D. karsteniana*, Scamman & Holdridge 7892. FIG. 562. Pinnule of *C. coniifolia*, Burger & Stolze 5231.

Cyathea reticulata Wercklé ex Christ, Bull. Herb. Boissier II, 5:251. 1905. TYPE: Volcán Irazú, Pcia. Heredia, 1800 m, *Wercklé 6* (P not seen; isotypes NY, P not seen, US).

Plants terrestrial, at (400)1600–2000 m elevation, in forests, from the Cordillera Central and near Boquete. Also from Venezuela, Colombia, and Ecuador.

558. *Alsophila polystichoides* Christ in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 177. 1896.

Alsophila mucronata Christ in Dur. & Pitt. Bull. Soc. Roy. Bot. Belgique 35, Mém. 178. 1896. TYPE: Confluence of the Río Puerto Viejo and the Río Sarapiquí, Pcia. Heredia, *Pittier 7484* (BR not seen photo 4924; isotype US).

Cyathea hastulata Christ, Bull. Herb. Boissier II, 4:945. 1904. TYPE: Arias Agua Punta, Costa Rica, *Wercklé* (P not seen; isotype NY).

Cyathea werckleana Christ, Bull. Herb. Boissier II, 6:181. 1906. LECTOTYPE: La Palma, Pcia. S. José, 1459 m, *Tonduz 12677* (P not seen; isoelectotypes B not seen, US), chosen by Gastony (*Contr. Gray Herb.* 203:144. 1973).

Cyathea hemiotis Christ, Bull. Herb. Boissier II, 6:182. 1906. TYPE: Navarro, La Luna, Pcia. Cartago, *Wercklé* (P? not seen; authentic material BM not seen, NY, P not seen, UC, US).

Cyathea caduca Christ, Bull. Herb. Boissier II, 7:271. 1907. TYPE: Jardín de Carmiol, San José, Pcia. S. Jose, *Wercklé* in 1906 (P not seen; isotype fragm US).

TYPE: Above Aragón, Pcia. Cartago, 600 m, *Pittier 9017* (BR not seen photo 4934 fragm NY; isotype US).

Plants terrestrial, at 700–2000 m elevation, in forests, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí.

66. SPHAEROPTERIS Bernh.

Plants terrestrial, arborescent; caudices erect, woody, with a thick covering of adventitious roots, especially at the base, scaly, the scales concolorous but with dark, marginal, spine-like cells; stipes stout, long, smooth or nearly so, not spiny, scaly, the scales concolorous, whitish or tan, with all cells alike in orientation, thickness, and color, except for the marginal spine-like cells, the stipes also bearing a scurf of minute, branched, darkened hairs; laminae 2(3)-pinnate-pinnatifid to 2-pinnate-pinnatisect, the segments entire, coriaceous; veins rarely simple, usually 1-forked; sori lateral at the fork of a vein, indusiate, the indusium cup-shaped or globose, thin to firm; paraphyses long, clavate; sporangia short-stalked.

Paleotropical (many species), with 6 species in the Neotropics.

TRYON, R. M., Jr. 1971. The American tree ferns allied to *Sphaeropteris horrida*. *Rhodora* 73:1–19.

559. *Sphaeropteris brunei* (Christ) Tryon, *Contr. Gray Herb.* 200:20. 1970.

Cyathea brunei Christ, Bull. Herb. Boissier II, 4:947. 1904. TYPE: Costa Rica, *Brune & Wercklé* (P not seen; isotype GH, presumable isotype US).

Cyathea caesia Christ, Bull. Herb. Boissier II, 7:272. 1907. LECTOTYPE: La Palma, Pcia. S. José, 1500 m, 24 Nov 1905, *Wercklé 17008* (P not seen; isotype fragm US), chosen by Tryon (*Rhodora* 73:13. 1971).

Plants terrestrial, at 800–2000 m elevation, at forest margins and on cleared slopes, from the Cordillera Central, the Fila Las Cruces near S. Vito, and Pcia. Chiriquí. Also from the Depto. Magdalena, Colombia.

DICKSONIACEAE

Rhizomes prostrate, ascending, or erect and stout, with adventitious roots at the base and densely covered with long, soft, golden hairs at the apex; fronds large; stipes persistent, short to long, smooth, hairy at the base, the hairs long, straight, pale to dark brown; laminae 2-pinnate-pinnatifid to 5-pinnate, subcoriaceous, glabrous, glaucous, or sparsely hairy abaxially, hairy on the adaxial surface of the major axes; veins free, simple or forked 1–several times; sori submarginal or marginal at the end of a vein; indusia double, appearing globose or nearly so, the outer (false) indusium poorly to well developed from the margin of a lobe, the inner (true) indusium well developed, extrorse; sporangia long-stalked, the stalks thick, the capsules angular-globose; paraphyses catenate, at least slightly exceeding the sporangia; spores trilete.

1. Laminae up to 3-pinnate; major axes hairy on the adaxial surface; sori globose.

67. *Dicksonia*

1. Laminae at least 4-pinnate; major axes glabrous on the adaxial surface; sori subglobose, elongate laterally.

68. *Culcita*

67. DICKSONIA L'Her.

Plants terrestrial, arborescent; caudices erect, woody, with a thick covering of adventitious roots, especially at the base, hairy at the apex, the hairs soft, golden; stipes persistent, short to long, smooth, hairy, the hairs long, straight, pale to dark brown; laminae mostly 2-pinnate-pinnatifid or 3-pinnate, the segments entire (in sterile fronds) to lobed, coriaceous; veins mostly 1-forked; sori submarginal at the end of a vein, indusiate, the outer indusium prolonged from the margin of the lobe, the inner indusium tan, scarious, ciliate; paraphyses somewhat longer than the sporangia, catenate, with or without a glandular terminal cell; sporangia short-stalked.

Mostly Malaysia and the Pacific Islands; ca. 30 species.

MAXON, W. R. 1913. The North American ferns of the genus *Dicksonia*. Contr. U. S. Natl. Herb. 17:153–156.

1. Costae smooth to slightly rough and mostly glossy on the abaxial surface; fertile segments (2.5)3–3.5(4.5) mm wide; costae and costules glabrous to sparsely covered with lax, appressed, deciduous, somewhat catenate hairs and sometimes also with a few stiff, spreading, subdeciduous or persistent, usually terete, bristle-like hairs; soral paraphyses catenate without a glandular terminal cell.

560. *D. gigantea*

1. Costae slightly to decidedly rough and scarcely or not glossy on the abaxial surface; fertile segments 2–3 mm wide; costae and costules usually densely covered with lax, appressed, deciduous, somewhat catenate hairs, but bristle-like hairs absent; soral paraphyses catenate, often with a dark red, non-swollen, glandular terminal cell.

561. *D. karsteniana***560. *Dicksonia gigantea* Karsten, Fl. Columb. 2:177. 1869.**

Dicksonia lobulata Christ, Bull. Herb. Boissier II, 6:187. 1906. TYPE: Cerros de Velirla, Copey de Dota, Pcia. S. José, 2600–2700 m, *Tonduz 11789* (P not seen; isotype US).

Dicksonia navarrensis Christ, Bull. Herb. Boissier II, 6:188. 1906. TYPE: Valley of the Río Navarro, Pcia. Cartago, *Wercklé* in 1905 (P not seen; isotype BM not seen photo 7918).

Dicksonia ghiesbreghtii Maxon, Contr. U. S. Natl. Herb. 17:155. 1913. TYPE: Edo. Chiapas, Mexico, *Ghiesbreght 353* (US fragm NY).

TYPE: Mt. Guadalupe, Andes of Bogotá, Depto. Cundinamarca, Colombia, 2600 m, *Karsten* (LE or W not seen).

Plants terrestrial, at 1200–2000(2700) m elevation, in forests and shaded ravines, from the Cordillera Central, Cerro Tablazo, Cerro Carpintera, the upper Río Reventazón valley, the Cordillera de Talamanca to Pcia. Chiriquí, the Fila Costeña near S. Vito de Java, and Cerro Pirre and the Alturas de Nique (Pcia. Darién). Also from Mexico to El Salvador, Colombia, and Ecuador.

561. *Dicksonia karsteniana* (Klotzsch) T. Moore, Ind. Fil. 190, 313. 1860.

Balantium karstenianum Klotzsch, *Linnaea* 20:444. 1847. TYPE: Colonia Tovar, Edo. Aragua, Venezuela, *Karsten II* 9 (B not seen; isotype HBG not seen photos 5372, 5374).

Dicksonia sellowiana var. *arachneosa* Sodiro, *Anales Univ. Quito* 7(49):83 (repr. 44). 1892. TYPE: Volcán Corazón, Pcia. Pichincha, Ecuador, 3300 m, *Sodiro* (Hb. Sodiro not seen).

Plants terrestrial, at 1900–2300 m elevation, in forests and ravines, from the Cordillera Central and the Cordillera de Talamanca. Also from Venezuela and Colombia to Bolivia.

The American members of *Dicksonia* are in need of additional study; new, perhaps chemical, data would be especially welcome. This species and *D. gigantea* are not always easily separated; the largely southeastern Brazilian *D. sellowiana* Hook. apparently differs in having soral paraphyses shorter than the sporangia.

68. CULCITA K. Presl

Plants terrestrial, not arborescent; rhizomes prostrate or ascending, rarely erect at the apex, woody, with adventitious roots, especially at the base, hairy at the apex, the hairs soft, twisted, golden; stipes long, smooth, hairy, the hairs long, straight, pale to rarely dark brown; laminae 4-pinnate-pinnatifid or 5-pinnate, the segments subcoriaceous, lobed, the sterile lobes acute at the apex; sori marginal at the end of a vein, indusiate, the indusia wider than long, the outer indusium scarcely prolonged from the margin of the lobe, the inner indusium opposed, tan, firm, eciliate; paraphyses much longer than the sporangia, catenate, without a glandular terminal cell; sporangia short-stalked.

One species of the Atlantic islands and southwestern Europe and one in the neotropics. Other species formerly placed here belong in *Calochlaena*.

MAXON, W.R. 1922. The genus *Culcita*. *J. Wash. Acad. Sci.* 12:454–460.

TURNER, M. D. and R. A. WHITE. 1988. *Calochlaena*, a new genus of Dicksonioid ferns. *Amer. Fern J.* 78:86–95.

562. *Culcita conifolia* (Hook.) Maxon, Annual Rep. Board Regents Smithsonian Inst. 1911:488. 1912.

Dicksonia conifolia Hook. *Sp. Fil.* 1:70, t. 24A. 1844. TYPE: Mérida, Edo. Mérida, Venezuela, *Linden* 538 (K not seen; isotype BR not seen photo 4847).

Dicksonia martiana Klotzsch ex Hook. *Sp. Fil.* 1:70, t.24B. 1844. TYPE: Southern Brazil, *Sellow* (B or K not seen).

Culcita schlimensis Fée, *Icon. Esp. Nouv. [Mém. Foug. 10]: 47, t. 36, f. 3.* 1865. TYPE: Ocaña, Depto. Norte de Santander, Colombia, *Schlim* 322 (RB not seen).

Plants terrestrial, at 2000–3300 m elevation, in forests, thickets, and clearings, from the Cordillera Central and the Cordillera de Talamanca to Pcia. Chiriquí. Also from Cuba, Jamaica, Hispaniola, Mexico, El Salvador, Venezuela, Colombia to Peru, and Brazil.

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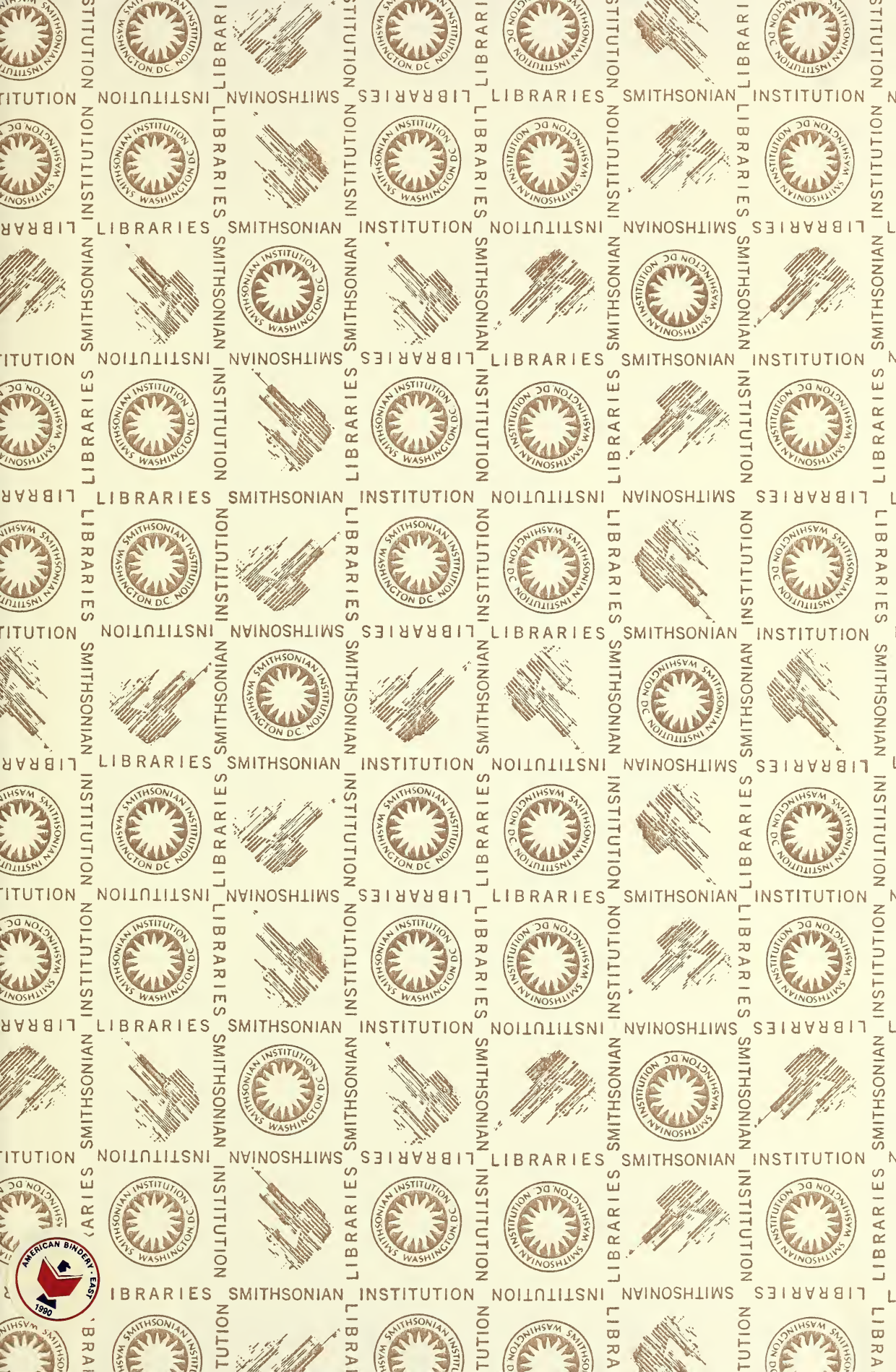
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